An investigation into the processes and mechanisms underlying the comprehension of metaphor and hyperbole

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I, Felicity Deamer, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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ABSTRACT

In this thesis I investigate the mechanisms and processes underlying figurative language comprehension. I attempt to determine whether there might be something unique about metaphor due to the interpretation processes involved, or whether metaphoric interpretations are in fact processed in the same way as other non-literal uses of language, such as hyperbole. Various theoretical accounts of figurative language interpretation from different pragmatic and psychological processing models are examined from an empirical perspective as a way of exploring the cognitive basis of their claims. Previous empirical research investigating metaphor comprehension is critically discussed not just from a psychological perspective, but also in relation to pragmatic accounts of figurative language.

There is a plethora of past and current theoretical literature on metaphor, which over the last few decades has been discussed in relation to psycholinguistic research investigating metaphor processing. In contrast, despite recent unified pragmatic accounts of figurative language, which posit a unified account of metaphor, hyperbole, and other loose uses, there has been little, if any empirical research looking at hyperbole or other tropes. This leaves us with an important question; can what we know about the processing of metaphor be generalised to other tropes such as hyperbole? With this question in mind, I will present a series of on-line and developmental experiments, aimed at further exploring the processes and mechanisms underlying metaphor comprehension, and directly contrasting the processing of metaphor and hyperbole.

The results of these experiments have implications both for psycholinguistic research on non-literal language processing, and for lexical pragmatic accounts of figurative language comprehension, but also for developmental research investigating children's pragmatic capacities. As well as shedding light on the cognitive processes involved in constructing metaphoric and hyperbolic interpretations, the findings of this thesis give us some indication of the cognitive mechanisms that need to have developed in order to arrive at a non-literal interpretation of an utterance.

Words: Experimental pragmatics, language processing, figurative language, metaphor, hyperbole, psycholinguistics, pragmatics, language acquisition, inferential processes.

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INTRODUCTION

This thesis is an experimental investigation into the processes and mechanisms involved in arriving at metaphoric and hyperbolic interpretations. I present findings from a series of on-line and developmental experiments aimed at shedding light on which of several pragmatic and psychological accounts best capture the cognitive processes underlying the interpretation of metaphor and hyperbole, and determining whether there might be something unique about metaphor due to the interpretation processes involved, or whether metaphoric interpretations are in fact processed in the same way as other non-literal uses of language, such as hyperbole.

Metaphor (e.g. the politician's speech was noxious) and hyperbole (e.g. The earl grey tea was noxious) are two common types of figurative language. Both are seen as types of non-literal language, in which the meaning the speaker intends to communicate is not that which is lexically encoded. There is a plethora of past and current theoretical literature on metaphor, which over the last few decades has either been backed up, or drawn into question by an ever-increasing amount of psycholinguistic research investigating metaphor processing. In contrast, despite recent unified pragmatic accounts of figurative language interpretation in which the difference between metaphor and hyperbole is seen to be a quantitative one, with metaphor being a further broadening of the encoded content than hyperbole, there has been little, if any empirical research looking at hyperbole or other tropes. This leaves us with an important question; can what we know about the processing of metaphor be generalised to other tropes such as hyperbole? With this question in mind, I will discuss findings from four on-line experiments, and two developmental experiments in which we directly contrast metaphor and hyperbole processing. As well as shedding light on whether unified accounts accurately capture the cognitive processes underlying both metaphor and hyperbole comprehension, the on-line experimental findings I discuss also address some remaining questions pertaining to how exactly metaphor is processed by adult comprehenders. In addition, the developmental findings I discuss provide insights with respect to young children's capacity to interpret both metaphor and hyperbole.

Metaphor and Hyperbole

Metaphoric and hyperbolic statements can appear in pretty much any context in which language is used; everyday communication, poetry, literature, news reports etc.

Metaphor	**Hyperbole**
a) The fridge was a monster	d) The earl grey tea was noxious
b) The university was a forest	e) The nursery school is a festival
c) My tooth brush is a sports car	f) My little road has become a motorway

Throughout this thesis I will refer to metaphor and hyperbole as separate tropes, however there is no agreed upon, strict definition for either category. In fact, as I will discuss (see section 1.6.1), some theorists (Wilson and Carston 2007) argue that hyperbole is simply less of a 'broadening' of the literal meaning than metaphor, but that they are essentially the same phenomenon, requiring the same explanation. It is this claim that motivates this thesis, which among other things, aims to clarify the degree of similarity between the two tropes and their comprehension procedures. Therefore, to define metaphor and hyperbole at this stage is essentially to beg the question that I aim to address in this thesis. Below, however, are the Collins English dictionary entries for the two terms, which provide an indication of how the terms are generally used:

Hyperbole: 'A deliberate exaggeration used for effect'.

Metaphor: 'A figure of speech in which a word or phrase is applied to an object or action that it does not literally denote in order to imply a resemblance'

The above definitions coincide with an observation that can be used to distinguish the two tropes. Metaphors contain category violations, where hyperboles do not. For example, in the metaphor in (a), there is no context in which a fridge can be literally described as a monster. It is a category violation to include a fridge in the category of monsters because fridges fall outside of the denotation of the term 'monster'. Monsters are animate, where fridges are not. However, with respect to the hyperbole in (d), in certain contexts it is possible for earl grey tea to be noxious (e.g. if it had been spiked, or if it is passed its sell-by date), whereas, in a hyperbolic context (e.g. if

the drinker found it not to their taste), it is an exaggeration to describe the tea as noxious.

Metaphors and hyperboles vary in familiarity from the highly conventionalized to the completely novel. Those listed in (a-f) are all novel, however those listed below in (g) and (i) are fairly familiar, and those in (h) and (j) are highly conventionalized.

Metaphor	**Hyperbole**
g) My day has been a car crash	i) This house is a palace
h) My daughter is an angel	j) This bath is boiling

As will be discussed in some detail later in this chapter, where a metaphor falls on the familiarity continuum is thought to affect how that metaphor is processed (i.e. via disambiguation or on-line meaning construction). In order to ensure that we are investigating the cognitive processes underlying the construction of a novel, occasion specific non-literal interpretation, rather than the selection of a contextually appropriate meaning from a series of already available meanings, completely novel metaphors and hyperboles (such as those in a-f) were used in all of the experiments discussed in this thesis.

The familiar metaphors and hyperboles listed above, though highly familiar, they are still thought to be distinct (with respect to processing) from idiomatic expressions such as those in (k-m) (Glucksberg 2001:68).

k) You are pulling my leg

l) He kicked the bucket

m) She let the cat out of the bag

In (a-j), there is a clear relationship between the linguistically encoded meanings and the figurative meanings. However, what is characteristic of idiomatic expressions, such as those in (k-m), is that there appears to be no obvious relationship between the linguistic content and the non-literal meaning. Though familiar metaphors and hyperboles such as those in g-j will not be used in the experiments presented in this thesis, they will be discussed in the beginning chapters in order to contrast them with completely novel metaphors in processing terms. However, although idiomatic

expressions deserve attention in their own right, but they will not be discussed in any detail in this thesis.

Theoretical background

There is no theoretical consensus on how figurative language interpretation should be accounted for. Figurative language has wide reaching implications across a range of disciplines: Poetics, Literature, Epistemology, Semantic theory, Pragmatic theory, and Psycholinguistics. Such linguistic phenomena raise a multitude of interesting questions, the answers to which are of great importance to the aforementioned areas of study, which means that a number of different theories have been put forward from various different perspective.

On the basis of empirical evidence, most current accounts reject a sequential processing model in which a default literal interpretation must be arrived at and rejected as contextually inappropriate before an alternative, more appropriate meaning can be derived, and opt for some sort of parallel processing model. However, whether figurative utterances of the form X is Y (The fridge was a monster) are processed as categorization statements (Carston 2002; Wilson and Carston 2007; Glucksberg 2001) as their syntactic structure suggests, or whether they are processed as implicit comparison statements, and processed as such is a matter for debate (Clement & Gentner, 1991, Forbus, Gentner, & Law, 1994; Gentner, Rattermann, & Forbus, 1993, Wolff and Gentner 2011). In the early chapters of this thesis, I will discuss how various current accounts of figurative language (predominantly metaphor) measure up to existing empirical evidence relating to metaphor processing.

Despite their disagreements over the exact processes that take place during metaphor comprehension, most current accounts share the assumption, which is supported by empirical evidence, that while processing novel nominal metaphors (e.g. The fridge was a monster), features associated with the literal meaning of the metaphor vehicle lose activation, though few claims are made with respect to whether this deactivation would result from active suppression, or passive decay (due to lack of attention). Many authors of empirical research investigating activation levels of metaphor irrelevant information associated with the lexically encoded content of the utterance argue that their findings are suggestive of active suppression taking place during the

processing of novel metaphors. However, as I will discuss in some detail, many of these findings are somewhat inconclusive.

Can what we know about the processing of metaphor be generalised to hyperbole?

I will argue that all of the current psychological and pragmatic accounts discussed in this thesis implicitly suggest that all non-literal utterances of the form X is Y are processed in the same way, regardless of whether we might categorise that utterance as a metaphor (e.g. the politician's speech was noxious) or as a hyperbole (e.g. the earl grey tea was noxious). Indeed, Relevance theoretic lexical pragmatists (Wilson and Carston 2007; Carston 2002) explicitly posit a unified concept construction account of figurative language in which they claim that all utterances in which a vehicle term (e.g. 'shark' in 'that defence lawyer is a shark') is used to convey a broader sense than that which encoded (e.g. metaphor, hyperbole, approximation), are processed in the same way.

As already mentioned, there is little, if any, research comparing metaphor and hyperbole. Recent on-line empirical research has focused almost exclusively on metaphor despite the current, unified accounts discussed above. This means that, as yet, we are unable to determine whether unified accounts of figurative language adequately capture the processes involved in both metaphor and hyperbole comprehension, or whether earlier philosophical accounts (Black 1962, 1979; Davidson 1978) were correct to treat metaphor as a unique phenomenon, worthy of its own account.

The data reported in this thesis will allow us to directly contrast the processing of metaphors and hyperboles, with the aim of shedding light on any processing similarities and differences between the two tropes. The findings discussed also contribute to the existing adult and developmental data on metaphor processing.

Outline of the thesis

The theoretical discussion and experimental work presented in this thesis constitutes an investigation into what would be an adequate processing model of figurative language, as well as which cognitive mechanisms might underlie non-literal language

interpretation. Furthermore, a detailed discussion is provided of how adult and developmental experimental findings bear on the on-going theoretical debates.

In Chapter 1 I will give an overview of various theoretical accounts of metaphor, before discussing in more detail several current psychological and pragmatic accounts that make processing predictions, which can be empirically tested. Not all of these testable predictions are made directly by the authors of the accounts discussed, but, as I discuss in some detail, are deducible from the workings of the accounts posited. As already mentioned, although there is a lack of consensus with respect to the exact comprehension processes posited, all of these accounts either explicitly propose, or implicitly suggest that metaphor and hyperbole are processed in the same way.

In Chapter 2, I will review empirical research investigating the processing of figurative language. This literature tends to focus on metaphor given the disproportionate amount of attention given to metaphor in the theoretical literature. I will however, discuss a small amount of off-line research investigating hyperbole.

The five experiments presented in chapters 3 and 4 of this thesis were designed, for the most part, to address the following specific questions which emerge from my review of the theoretical and empirical literature:

1. Are there processing differences between metaphors and hyperboles?
2. Does arriving at a metaphoric or hyperbolic interpretation of an utterance reduce the activation level of the lexically encoded content enough to dampen priming as has been found with respect to metaphor?
3. If there are any processing differences between the two tropes, do these differences lie in the way in which the lexically encoded content is accessed and dealt with, or do any such differences occur further down the line when deriving inferences.

Where chapter 3 is dedicated to the presentation of a series of on-line (reading-time, word-naming and eye-tracking) experiments in which the processing of metaphors and hyperboles was directly investigated, chapter 4 is dedicated to the presentation of developmental findings, which as well as providing important insights into young children's capacities with respect to non-literal language interpretation, can tell us a lot about the processes and mechanisms required during the interpretation of these

tropes. With the predictions of current theoretical accounts, together with the questions in 1-3 held in mind, the developmental experiments reported in chapter 4 were designed to address the following specific questions.

4. Do we see any difference in the age at which children acquire the ability to comprehend hyperbole and metaphor?
5. Is there a correlation between the development of figurative language comprehension capacities and the development of inhibition control capacities?
6. Do we see a difference in how contingent the different tropes are on the development of Inhibition Control?

The findings reported in chapters 3 and 4 are important as they contribute to our understanding of a) how figurative language processing differs from the processing of literal language, if it differs at all, b) how figurative language interpretation affects lexical processing, c) whether the processes and mechanisms underlying metaphor and hyperbole comprehension differ, d) When children develop the ability to accurately interpret metaphoric and hyperbolic language, and e) Whether that ability is contingent on the development of inhibitory control capacities. Moreover, in shedding light on these issues, our findings will serve to verify some of the claims made by the current pragmatic and psychological accounts discussed in chapters 1 and 2.

1 THEORETICAL ACCOUNTS OF FIGURATIVE LANGUAGE

1.1 WHAT IS FIGURATIVE LANGUAGE AND WHY IS IT INTERESTING?

Metaphors and hyperboles such as those in a-f are two common types of figurative language that can appear in pretty much any context in which language is used; everyday communication, poetry, literature, news reports etc. and have been studied for centuries, from various different perspectives. Both are understood as instances in which the intended meaning is not that which is lexically encoded. Hyperboles are considered to be deliberate exaggerations, used for effect, whereas metaphors are considered to be instances in which a word is used to refer to an object, which would not 'literally' be included in its denotation 'in order to imply a resemblance' between the two objects.

Metaphor	**Hyperbole**
a) The fridge was a monster	d) The earl grey tea was noxious
b) The university was a forest	e) The nursery school is a festival
c) My tooth brush is a sports car	f) My little road has become a motorway

Many interesting theories and insights relating to the use and understanding of metaphor and figurative language have emerged in the work of thinkers and researchers from a multitude of different disciplines and schools of thought. Figurative language has wide reaching implications across a range of disciplines: Poetics, Literature, Epistemology, Semantic theory, Pragmatic theory, and Psycholinguistics. Such linguistic phenomena raise a multitude of interesting questions, the answers to which would be of great importance to the aforementioned areas of study. Why do we use metaphor? What is its function? What is communicated by a metaphor? How do we comprehend metaphors? Are metaphoric statements false? If so, why utter a false statement? Is metaphor a deviant form of language? Do we mean something beyond what is 'actually said' when we utter a metaphor?

The data reported in this thesis (see chapters 3 and 4) will hopefully shed light on at least some of these questions.

1.2 A BRIEF HISTORY OF THE STUDY OF METAPHOR

Aristotle

Perhaps the earliest thorough description and analysis of figurative language comes from Aristotle, who wrote:

"Metaphor is the application of a word belonging to something else either from genus [genos] to species [eidos], or from the species to the genus, or from the species to a species, or according to analogy." (poet.21 1457b7-9).

Aristotle proposed three types of metaphors in which he claimed that one term is substituted by another: genus (category or family) for species (sub category of a genus) (e.g. *"Here stands my ship"* – riding at anchor is a species of standing), and species for genus (e.g. *"Indeed ten thousand noble things Odysseus did"* – the 'species' of many 'ten thousand' is used instead of the word 'many'), or species for species (e.g. *"drawing off his life with the bronze"*- drawing off is used for severing, and severing for drawing off).

In most current accounts, metaphors in this format are usually referred to as 'nominal' metaphors or 'predicative' metaphors, and they have received the most attention in contemporary investigations of metaphor. The 'metaphors' Aristotle refers to as 'species for genus' are those that are now generally considered to be nominal hyperboles, rather than metaphors.

More recently, metaphor has been treated as a 'special' figure of speech, and has received almost all of the theoretical attention given to non-literal language. However, Aristotle saw hyperbole as one of three sub-types of metaphor, which could all be explained by his substitution theory. This unified approach to non-literal language is echoed in the current Lexical Pragmatic accounts of figurative language, which will be discussed later in this chapter (see section 1.6.1) (Wilson 2003; Sperber and Wilson 2006; Wilson and Carston 2007; Recanati 2001, 2004).

Aristotle made several observations relating to the function of metaphor and its effects. These observations reemerge in nearly all subsequent discussions of

metaphor, and are still relevant to current research investigating the processing of figurative language[1].

1. Aristotle thought metaphor to be a special form of language, and that such 'miss-applications' of terms allow us to perceive likenesses in a way which would not be possible otherwise:

> *"To use each of the things mentioned appropriately is a great thing, as well as using double and foreign words, but much the greatest is the metaphorical. For, just as it alone is not to be taken from another, so it is a sign of a good nature; for to make metaphors well is to contemplate what is like." (poet. 22, 1459a4-9).*

2. He believed metaphor to be informative and enlightening, and to play an important clarifying role during discourse:

" A word in its prevailing and native meaning and metaphor are alone useful in the lexis of prose. A sign of this is that these are the only kinds of words everybody uses; for all people carry on their conversations with metaphor and words in their native and prevailing meanings. Thus, it is clear that if one composes well there will be unfamiliar quality and it escapes notice and will be clear. This we said, was the virtue of rhetorical language." (rhet. 3.2.6, 1404b32-38)

"Metaphor especially has clarity and sweetness and strangeness, and its use cannot be learned from someone else. (rhet. 3.2.8, 1405a6-10)

3. He observed that metaphors have the property of "bringing-before-the-eyes"; prompting audiences to visualize imagery.

"*I call those things "before-the-eyes" that signify things engaged in activity. For example, to say that a good man is "foursquare" is a metaphor, for both are "complete"; but it does not signify activity [energeia]. On the other hand, the phrase "having his prime of life in full bloom" is energeia, as is "you, like a free-ranging animal" and "now then the Greeks darting forward on their feet." Darting is*

[1]Thanks to Diana Mazzarella (Presented 2012; UCL) for these interpretations of Aristotle.

actualization and metaphor; for he means "quickly." And [energeia], as Homer often uses it, is making the lifeless living through the metaphor. (Rhet. 3.11.2, 1411b26-32)

Aristotle associates "*before-the-eyes"* with "*energeia"* [activity]. He believes that metaphors have the quality of making things become real and active; unperceivable things become actual and perceivable.

To my knowledge, all subsequent accounts of metaphor, including contemporary pragmatic and psychological theories discussed in detail later in this chapter, incorporate some or all of the above observations (1-3).

Max Black and Donald Davidson

More recent philosophical analyses of metaphor put forward by Max Black (1962; 1979) and Donald Davidson (1978) attempt to define its place in, or relation to, a theory of semantics[2].

Black (1962; 1979), like Aristotle and many others before him, considered a metaphor to have, alongside its literal meaning, an alternative 'metaphorical' sense or meaning. Black's 'Interaction theory' of metaphor posits that a metaphorically intended statement encourages us to apply 'a system of commonplaces' associated with the metaphorical word, to the subject of the metaphor (i.e. in "*man is a wolf*" the hearer applies stereotypical attributes of a wolf to man). This is not dissimilar to Aristotle's observation (a) that metaphors allow us to perceive likenesses.

Like Aristotle's observation b), that a metaphor has an extra level of informativeness, or a certain enlightening property about it, Black also claims that metaphors have additional informative power. He argues that a literal paraphrase of a metaphor lacks *"the same power to inform and enlighten as the original……One of the points I most wish to stress is that the loss in such cases is a loss of cognitive content; the relevant weakness of the literal paraphrase is not that it may be tiresomely prolix or boringly explicit; it fails to be a translation because it fails to give the insight that the metaphor did."* (Black 1962:46)

[2] I am passing over medieval theories of metaphor (often inspired by Aristotle) and early modern theories, to get to theories closer to us and to our contemporary views on the topic (see Curtius 1965 for full review).

The challenge for Black was to devise a way in which the inferential process he posits could be accounted for within a theory of semantics. If a metaphoric statement has two meanings, how are these two meanings communicated via a single sentence?

Davidson (1978) argues that the assumption at the heart of most accounts of metaphor, that metaphoric statements are ambiguous, is mistaken. He believes that Black and others confuse "*the effects metaphors have on us*" with encoded content.

"*The common error is to fasten on the contents of the thoughts a metaphor provokes and to read these contents into the metaphor itself*" (Davidson 1978, in 1984:261)

"*When we try to say what a metaphor means, we realize there is no end to what we want to mention."* (Davidson 1978, in 1984:263)

Davidson claims that metaphors have just one meaning; their encoded 'literal' meaning. He argues that anything beyond this, which is evoked by the metaphor in a given context (i.e. thoughts, imagery etc.), is not part of the semantic content of the statement. He doesn't disagree with Black and Aristotle with respect to the effects and properties they attribute to *metaphor.*

"No doubt metaphors often make us notice aspects of things we did not notice before; no doubt they bring surprising analogies and similarities to our attention; they do provide a kind of lens or lattice, as Black says, through which we view the relevant phenomena". (Davidson 1978, in 1984: 261)

His disagreement is with Black's view of how metaphors produce these effects.

"A metaphor does its work through other intermediaries – to suppose it can be effective only by conveying a coded message is like thinking a joke or a dream makes some statement which a clever interpreter can restate in plain prose. Joke or dream or metaphor can, like a picture or a bump on the head, make us appreciate some fact – but not by standing for, or expressing, the fact." (Davidson 1978, in 1984: 262)

In short, Davidson argues that metaphorical effects lie outside of a theory of semantics; the project of defining how such effects might be part of the content of a metaphoric statement is a misguided one. If metaphorical effects are not part of the encoded content of a metaphorical utterance, how might such intended effects be conveyed? How might a hearer infer such effects on the basis of the encoded content?

These questions pertain to the domain of Pragmatics. If Davidson is correct, then we must turn to a Pragmatic theory for an account of metaphor interpretation. However Davidson, like Chomsky (1992a), believes that a coherent pragmatic theory is not possible because communication and interpretation are not topics that can be reasoned about using scientific methods (See Carston 2002:1).

"The interpreter, presented with an utterance and a situation, assigns some interpretation to what is being said by a person in this situation." But this, the topic of successful communication, "is far too complex and obscure to merit attention in empirical enquiry." (Chomsky 1992a:120)

The project of constructing a pragmatic theory has not been considered fruitless by everyone, though. Paul Grice (1957; 1967; 1975) developed an entire theory of meaning and communication, in which he set out to explain how hearers bridge the gap between sentence meaning and the speaker's intended meaning. Figurative utterances are particularly evident cases in which 'what is said' vastly underdetermines speaker meaning, and as such they are one of the phenomena which Grice attempts to explain with his 'inferential model of communication'. The next section will be dedicated to a detailed discussion of Grice's account.

This thesis investigates figurative language comprehension as a cognitive process, and examines how various theoretical accounts of figurative language measure up to empirical data. Therefore, I will focus on pragmatic accounts, stemming from Grice's account, which place pragmatics within the context of cognitive science, so that their theories can be evaluated experimentally, and psychological accounts which posit specific processing models that empirical facts can shed light on. These accounts and their empirical predictions will be discussed in detail in the next section[3].

[3]According to Linguist George Lakoff (1980; 1987; 1990; 1993), contrary to the accounts discussed here, metaphor transcends its linguistic manifestations, and reflects the metaphorical structure of our minds. Philosophical and pragmatic accounts of figurative language assume it to be a linguistic phenomenon which aids or enriches communication. Lakoff on the other hand, asserts that metaphoric expressions are indicative of the metaphorical makeup of our conceptual representations (i.e. mappings between conceptual domains). I will not directly address Lakoff's account in this thesis, although I will discuss Raymond Gibbs' psychological account, which is based on a similar premise.

1.3 GRICEAN PRAGMATICS AND THE MAXIM OF TRUTHFULNESS

This thesis will not focus very much on what our empirical findings can tell us about Grice because he offers a general model of communication (which aims to account for figurative language) rather than a specific processing model of figurative language, which means that the empirical claims which can be extracted from his writings are limited. Having said that, Grice's account forms the basis of most current pragmatic theories, including Relevance Theory (RT) (1986; 1995) which will be a main focus of this thesis. Grice's theory also inspired more or less distantly several of the psychological accounts of metaphor understanding. This being the case, this section is dedicated to introducing Gricean pragmatics, and its assumptions and predictions.

Recognition of speaker's intentions

Before Grice, accounts of communication were based on a code model which posits that an individual with a message to convey, produces the associated signal (an utterance), which is received and decoded by another individual who has at their disposal, an identical copy of the code. Grice, on the other hand, claimed that for successful communication to take place, as well as the ability to decode the explicit content of an utterance the hearer needs to be able to recognize the intentions of the speaker.

"*One of my avowed aims is to see talking as a special case or variety of purposive, indeed rational, behavior*" (Grice 1989:28/Grice 1975:47)

The co-operative principle and conversational maxims

Grice claims that hearers expect speakers to obey a 'Co-operative principle' (CP) and a set of 'maxims of communication'. It is this expectation, together with the speaker's recognition of the hearer's expectation, which Grice argues, allows for successful communication. According to Grice, the best hypothesis a hearer can make about a speaker's intended meaning is the one that satisfies those Co-operative principle and maxims. The CP and maxims are detailed below.

Grice's Co-operative principle:

*Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged. (*Grice 1989:26)

Grice's conversational maxims:

Quantity (informativeness):

1. Make your contribution as informative as is required (for the current purposes of the exchange).

2. Do not make your contribution more informative than is required.

Quality (truthfulness):

Supermaxim: Try to make your contribution one that is true.

1. Do not say what you believe to be false. ('maxim of truthfulness')

2. Do not say that for which you lack adequate evidence.

Relation (relevance):

1. Be relevant.

Manner (clarity):

1. Avoid obscurity of expression.

2. Avoid ambiguity.

3. Be brief (avoid unnecessary prolixity).

4. Be orderly.

Grice claims that during a communicative exchange, a hearer assumes the speaker is obeying the CP and maxims in saying 'what is said', and that it is this assumption together with the recognition of the speaker's intentions, that allows the hearer to infer the full signification of the utterance.

Conversational implicatures

Critical to Grice's account is his notion of a 'conversational implicature', which is a

set of propositions that can be attributed to the speaker during a communicative exchange. A conversational implicature can be inferred either in response to an apparent flouting of one or more of the maxims in order to preserve the assumption that the speaker was obeying the CP and the maxims (or at least the CP) in saying what was said, or as a result of the speaker having explicitly obeyed the CP and maxims.

Grice describes three types of conversational implicature:

Resulting from obeying the CP and maxims

On the basis of a speaker having apparently obeyed all of the maxims in saying what is said, a hearer may draw inferences that are not part of what is said. So long as the speaker does not indicate in any way that the hearer is not justified in drawing such inferences, then Grice argues that those inferences count as conversational implicatures. An example of this kind of implicature is g).

g) A: I am hungry

B: There is a shop next door

B would not be obeying the maxim of relevance if he knew that the shop next door was actually closed for renovation, or that it in fact sold paint-brushes, not food. Therefore, B's utterance can be taken to conversationally implicate that the shop will be open and it will sell something to eat (see Grice 1975/1989:32).

Resulting from a conflict between maxims

It is possible that in certain circumstances a speaker may need to flout one maxim in order to obey another more important one. Such a case is illustrated in (h)

h) A: What is the name of the lead actress in the film we watched last night?

B: It begins with a 't'

B's utterance is clearly under-informative, and thus flouts the maxim of quantity. However, A will probably infer that B did not want to say something for which she lacked adequate evidence, and so flouted the maxim of quantity in order to not flout the maxim of quality, which is arguably more important. On this basis A would take

B's utterance to implicate that B isn't sure of the name of the actress in the said film.

Resulting from a flouting of a maxim

In some instances a speaker will intentionally flout a maxim in order to convey a conversational implicature. See the example in i) below.

i) A: Have you seen the price of petrol these days?

B: I don't have a car

B explicitly communicated that B doesn't have a car. However, based on B's apparent flouting of the maxim of relevance, A would take B's utterance to conversationally implicate that B hasn't seen the price of petrol recently because she has not got a car. It is this implicature that fleshes out A's utterance in order for A to preserve the assumption that B is obeying the maxim of relevance.

Grice argued that an apparent violation of a maxim can disappear when an implicature is arrived at, but in some instances the apparent violation of a maxim is overt and blatant, and remains even when an implicature is supplied. It is among these kinds of utterances that Grice places metaphor.

Non-literal language

Grice proposed that non-literal language production involves the flouting of the conversational maxim of truthfulness, which is the first maxim of quality**.** He argued that if someone utters the metaphor in j), they are blatantly flouting the maxim of truthfulness by uttering a false statement: no human can be cream in coffee.

j) You are the cream in my coffee

However, that 'you are not the cream in my coffee', is such a trivial fact that it cannot be this that the speaker is trying to communicate. Instead, Grice claims that in using this utterance, the speaker is attributing to the hearer a feature of 'cream', in this instance it would be a feature such as 'delightful'. Grice claims that having recognized the intended meaning of the speaker (in this case, the intention to attribute a feature such as 'delightful' to the hearer), the hearer would infer that intended meaning to be an implicature of the speaker's utterance.

According to Grice's argument, a metaphor (or any non-literal statement, e.g. hyperboles) can be recognized whenever an utterance is considered to be false according to how things are in the world. The hearer arrives at the literal meaning of an utterance, and only then, if it is considered to flout the maxim of truthfulness, will the hearer assume that the speaker is flouting this maxim in order to communicate a non-encoded implied meaning, and thus derive the implicature.

Grice considered implicatures to be outside of the semantic content of an utterance; an implicature does not contribute to the 'proposition expressed', to what is said, by the utterance. The explicit content of the utterance is already 'literally false' according to the truth conditions, so the metaphorical interpretation is part of the implicit content of the utterance.

Summary of Grice's account

Grice (1967) sketched a theory of utterance interpretation based on a Co-operative Principle and maxims of truthfulness, informativeness, relevance and clarity (Quality, Quantity, Relation and Manner). Grice claimed that hearers expect speakers to obey a 'Co-operative principle' (CP) and a set of 'maxims of communication'. It is this expectation, together with the speaker's recognition of the hearer's expectation, which Grice argues, allows for successful communication.

It is the maxim of truthfulness that Grice argues we are intentionally flouting for effect when we produce a non-literal utterance. According to Grice, a metaphor (or any other non-literal statement) can be recognized whenever an utterance is considered to be false. The hearer arrives at the literal meaning of an utterance, and only then, if it is considered to flout the maxim of truthfulness, will the hearer assume that the speaker is flouting this maxim in order to communicate a non-encoded implied meaning, and thus derive the implicature.

Potential problems with the Gricean account

A potential limitation of a Gricean approach is its inability to account for instances of loose use which, intuitively, appear related to metaphor. As discussed, Grice argues that lies, jokes, metaphors, hyperboles and ironies are all cases in which his maxims are purposely violated. Wilson and Sperber (2002) argue that although this is a reasonable way to account for these phenomena, approximations (e.g. 'The lawn is

flat' or 'The water is boiling') and other loose uses (e.g. 'the glass' when referring to a plastic picnic cup), which they argue are closely related to metaphor, are not so easily accounted for by Grice's maxims. It does not seem accurate to claim that in uttering (k), the speaker is intentionally flouting the maxim of truthfulness.

k) Let's sit here for the picnic, it is flat (referring to a patch of grass in a field which is unlikely to be absolutely flat).

The utterance in k) is approximately true, and for the purposes of the communicative exchange it is true enough. However, when is an utterance true enough? If the maxim of truthfulness is adjusted to account of approximations and loose uses such as those in k), then we would be left with a very vague notion of truthfulness which would not be robust enough to explain how a hearer is able to arrive at a speaker's intended meaning.

The degree to which approximations and loose uses diverge from the strict literal sense varies from occasion to occasion, and their acceptability varies with content and context. The same statement can be an acceptable approximation in one situation and not in another. The utterance in l) would be an acceptable response to the question '*what time does the party start?*', when the speaker of l) thinks that people will be generally arriving for the party between 7.30 and 8pm, but not to the question '*what time does the train leave?*', when the speaker believes that the train will be leaving at 7.57pm.

l) At 8pm

m) I had to run to the shops

n) I don't suppose you have got a hoover I can borrow

Indeed, Lewis (1979) put forward an account of such instances, in which he posited that there are *"contextually-determined standards of precision"* which guide us when interpreting such utterances. However, m) and n) illustrate that there are cases in which 'degrees of approximation' or 'standards of precision' do not seem appropriate. As Wilson and Sperber (2002) argue, although walking and running generally differ in speed, the two actions are not at either end of a gradient. There is a sharp cut-off point between walking and running; it is not just a matter of speed. Walking at 8km

an hour is not the same as running 8km an hour, the two actions are qualitatively different. Therefore, it is hard to claim that the speaker of m) 'approximately' ran to the shops, when they had just walked there fast due to being in a rush. Moreover, a speaker of n) most likely requires a vacuum cleaner in order to clean up some mess, and they are unlikely to have a preference for the specific brand (Hoover). They are using the term 'hoover' loosely to refer to all vacuum cleaners, but it does not seem appropriate to say that the speaker is using the term approximately. The words 'hoover' and 'run' have clear conceptual boundaries, which cannot be broadened to pick out instances that 'approximately' fall within their denotations.

For Wilson and Sperber (2002) these data cast doubt over the existence of a maxim of truthfulness, and the assumption that there is a default 'literal' meaning. But also, over a vague notion of truthfulness, or pragmatic vagueness such as that put forward by Lewis (1979).

Grice did not concern himself with a cognitive model of language processing, which means that his theoretical account of figurative language, as it stands, makes no psychological processing predictions. Consequently, Grice's account cannot be empirically tested, and thus cannot be objected to on the basis of inconsistencies with empirical findings. However, as I will discuss below, subsequent neo-Gricean accounts have adapted Grice's theory, such that they posit a stage-by-stage comprehension procedure, which does make processing predictions that can be empirically tested. See below for full discussion.

1.4 NEO-GRICEAN 'LITERAL FIRST' ACCOUNTS

Until recently, like Grice's account, most accounts of metaphor were based on the assumption that every metaphorically intended utterance has a default literal interpretation, and that the intended meanings of such utterances are generated by systematic departures from that literal meaning. The key difference between Grice's account and neo-Gricean philosophical (Searle 1979), psychological (Clark and Lucy 1965; Janus and Bever 1985) and linguistic (Lyons 1977) accounts of non-literal language comprehension is that the neo-Gricean accounts posit a stage-by-stage,

psychologically real comprehension procedure, which means that they can be measured up against empirical evidence from psycholinguistic experiments, which can tell us about how we process language.

The assumption that there exists a default literal meaning leads to a 'standard three-stage model of non-literal language comprehension'.

1. First derive the literal meaning of an utterance
2. Secondly, test the derived literal meaning against the context
3. Finally, if the literal meaning makes sense in that context, then accept it as the intended meaning. If it doesn't make sense in that context, search for an alternative, more contextually appropriate meaning.

"Where the utterance is defective if taken literally, look for an utterance meaning that differs from sentence meaning" (Searle 1979:114)

Two applications of this standard three-stage model are discussed below (standard comparison accounts, and the salience imbalance account).

1.4.1 METAPHORS AS IMPLICIT SIMILES

Proponents of 'comparison accounts' (Tversky 1977; Clark & Haviland 1977; Searle 1979) claim that, based on the recognition that a metaphoric utterance is defective (false) if understood literally, hearers transform the false categorical statement into a true simile; realising that the statement cannot be intended literally, as a category assertion, the hearer interprets it as though it were a simile (i.e. My lawyer is like a shark). Not all, but a particular subset of features of the vehicle topic and vehicle concept are compared. So, when a speaker utters "Mary is an angel", she is communicating that Mary is in some way(s) similar to an angel. The context would determine where those similarities lie.

The advantage of a comparison (implicit simile) account is that it simplifies the problem of how we process metaphoric statements. If metaphors are recognized as

being implicit similes, then they can be processed just as literal comparisons are processed, and they pose no further problems of interpretation.

Potential problems with a comparison model

Any comparison theory of how we process metaphor, must account for how the particular subset of features for comparison are selected in a given context. Glucksberg (2001) argues that this process can be nothing other than the interpretation of the comparison assertion itself; to understand a comparison, is to identify the respects in which the two terms are alike, namely 'the grounds for the comparison'. Therefore, Glucksberg (2001:chapter 1) argues, the comparison model cannot be a model of how metaphors are understood but instead it is a model of how people judge the degree to which two things are similar in certain contexts. Rather than providing a model of metaphor comprehension, comparison models can only provide a model of similarity.

In addition, Glucksberg (2001:chapter 1) illustrates that the direction of the comparison between the topic and vehicle can yield different features to be compared. E.g. 'Canada is like the US' VS. 'the US is like Canada'. The features of the US attributed to Canada in the 1st comparison may be completely different to those in the second. Metaphorical comparisons offer the most extreme cases of this asymmetry. They are not just asymmetrical as in the example above; they are completely irreversible (e.g. 'the butcher is a surgeon' has a completely different meaning to 'the surgeon is a butcher'). On this basis, Glucksberg argues that the comparison model is not sufficient in explaining the comprehension processes underlying metaphor.

Finally, empirical data cast doubt over any account that applies the three-stage processing model. These findings will be discussed in detail in section 2.1.2.

1.4.2 SALIENCE IMBALANCE ACCOUNT

Ortony (1979) attempted to develop a comparison account that got around the criticisms mentioned above. In contrast with standard comparison accounts, he argued that metaphoric comparisons involve two objects (a topic and a vehicle) that do not

share any salient features or properties. Ortony claimed that the grounds for a metaphoric comparison are those features that are salient of the vehicle, but are not salient of the topic, rather than features that are salient of both the topic and vehicle concepts. So in *"John is a shark"*, John is being compared to the salient features of SHARK[4] (e.g. TENACIOUS; PREDATORY; AGGRESSIVE). Ortony proposed that this salience imbalance in the comparison process is what makes a metaphor a metaphor *"The essence of metaphoricity is salience imbalance"* (Ortony 1979: 179)

Potential problems with the salience imbalance model

Glucksberg (2001: chapter 1) argues that in order for a literal comparison to be informative, just like a metaphoric comparison, it must have a low/high salience imbalance. It cannot be a high/high balanced comparison because it would not be informative to the hearer to point out that two things have shared salient features because the hearer must already know the features of the topic and vehicle in order to access these features. Therefore, in order for a comparison to be informative, whether it is literal or metaphoric, there must be a salience imbalance. Therefore salience imbalance cannot account for distinguishing between literal and metaphoric utterances.

In addition, Glucksberg illustrates that often the speaker's intention when using a metaphor, is to introduce new properties or features to the hearer's 'topic' concept. Glucksberg illustrates how such cases are a problem for the salience imbalance account. Consider the metaphor in o).

o) Jane is a monster

Before hearing the utterance in o), the hearer may not have already known that Jane had any of the qualities of a monster. In this case, features associated with the hearer's concept MONSTER would not be associated with the hearer's concept JANE at all. In such instances in which salient features associated with the vehicle concept (e.g. MONSTER) are not associated at all with the hearer's topic concept (e.g. JANE) then the salience imbalance account cannot work. The feature mapping process cannot take place.

[4] I will use the convention of capital letters when referring to a concept

Moreover, although Ortony attempted to provide an account which avoided Glucksberg's general criticisms of a comparison account, as with the standard comparison account, Ortony's account still comes up against empirical evidence suggesting that there is no default literal interpretation (X is like Y), which is an assumption of this account.

Finally, like the standard comparison accounts, Ortony's salience imbalance account applies the three-stage processing model of non-literal language, and thus falls foul of empirical data that suggests that such a model is wrong.

1.5 PROBLEMS WITH THE THREE-STAGE PROCESSING MODEL

The above 'literal first' accounts, although theoretically distinct from one another, share one key psychological prediction; metaphors are processed via a three-stage processing model:

1. Derive the literal meaning of an utterance
2. Test the derived literal meaning against the context
3. If the literal meaning makes sense in that context, then accept it as the intended meaning. If it doesn't make sense in that context, search for an alternative, more contextually appropriate meaning.

Glucksberg (2001) argues that this processing model makes four clear predictions. Firstly, literal interpretations are unproblematic and context independent. Secondly, literal meanings have unconditional priority over any alternative interpretation, and will thus be quicker to process. Thirdly, literal meanings are derived automatically, whereas metaphoric interpretations are optional. Finally, metaphors are processed as comparison statements rather than as category assertions, as their form would suggest. As we will see in Section 2.1.1, these predictions are not born out in the majority of the data investigating metaphor processing (e.g., Inhoff, Lima and Carroll 1984, Blasko and Connine 1993, Ortony, Schallert, Reynolds and Antos 1978, Blasko and Connine 1993, Glucksberg, Gildea & Bookin 1982, McElree and Nordlie 1999). See section 2.1.1 for a full discussion.

On the basis of these empirical findings, many current accounts of non-literal language comprehension have rejected the three-stage processing model in favour of a parallel processing model in which there is not default interpretation. These accounts are discussed below.

1.6 BEYOND LITERALNESS

Current theories of metaphor disagree about the exact comprehension procedures involved in interpreting a metaphoric utterance. For example, is it a case of matching properties between the topic and vehicle concepts? Or is it a case of attributing properties from the vehicle concept to the topic? However, one thing that current pragmatic and psychological accounts largely agree upon, based on the empirical findings mentioned above (see section 2.1.1 for full discussion), is that metaphor comprehension is not a three stage, sequential process. Most current, accounts now propose some sort of 'parallel processing' model in which the encoded and non-encoded content are processed in parallel (See Carston 2002:326,358; Wilson and Carston 2007:28; Recanati 2004:54; Glucksberg and Keysar 1990; Gentner and Wolff 2000; 2011; Giora 1999).

Although most psychological accounts of non-literal language focus on metaphor, in response to observations of clear parallels between metaphor and other tropes (Sperber and Wilson 2006), recent pragmatic accounts, and, in particular relevance-theorists, such as Sperber and Wilson (2006) and Wilson and Carston (2007), have explicitly posited 'unified' accounts of figurative language, which aim to account for all figurative uses including metaphor and hyperbole. Furthermore, alternative accounts, for instance Glucksberg and Keysar's (1990) class-inclusion account, and Gentner and colleague's (Clements and Gentner 1991; Wolff and Gentner 2011) Structure-Mapping account, in which tropes other than metaphor are not discussed, nonetheless clearly suggest that hyperbolic statements of the form X is Y, are processed in the same way as metaphoric statements of the same form.

The rest of this section is dedicated to a thorough discussion of current pragmatic and psychological accounts of figurative language that I will measure up against both existing empirical findings (chapter 2), and our new findings (chapter 3).

As one of the objectives of this thesis is to test whether the processes and mechanisms underlying the comprehension of metaphors and hyperboles are the same (as is proposed by current lexical pragmatic accounts (Wilson and Carston 2007; Recanati 2001; 2004), I will discuss each theory, not just as an account of metaphor, but in relation to hyperbole as well.

1.6.1 RELEVANCE THEORY AND FIGURATIVE LANGUAGE

Relevance Theory (RT), like most recent pragmatic theories, has inherited some fundamental principles from Gricean pragmatics (see Sperber and Wilson 1986/95), but they do reject other aspects of Grice's theory, and in doing so, they construct an alternative framework which provides an account of human communication in a broader context of human cognition (See Sperber and Wilson (1986/95) and Wilson and Sperber (2012) for a full and detailed discussion of Relevance theory, and Carston (2002) for a thorough analysis of its implications).

Like Grice, Relevance Theorists believe human communication to be inferential, and that successful communication requires expressing and recognizing intentions. Moreover, like Grice, they argue that every utterance carries with it, an expectation of relevance; hearers assume that a speaker's utterance will be relevant enough to be worth their attention. However, unlike Grice, Relevance theorists argue that this presumption of relevance results from a general principle of human cognition, rather than a co-operative principle or a set of maxims. By placing their theory of communication in a broader context of human cognition, Relevance theorists allow themselves the opportunity to avoid positing rules or maxims.

"According to relevance theory, utterances raise expectations of relevance not because speakers are expected to obey a Co-operative Principle and maxims or some

other specifically communicative convention, but because the search for relevance is a basic feature of human cognition, which communicators may exploit." (Wilson and Sperber 2004)

Positing a cognitive leaning towards relevance allows Relevance theorists the opportunity to avoid the maxim of truthfulness, which they argue is problematic in light of the numerous different ways in which we use language loosely.

A maxim of truthfulness has the effect of reducing the gap between sentence meaning and speaker's explicit meaning to a minimum; speakers will always endeavor to make their utterances true. Grice argued that speaker meaning could be inferred simply by assigning reference to referring expressions, and deriving any communicated implicatures. One of the reasons, theorists have always wanted to keep the gap between sentence meaning and speaker's meaning as small as possible, is because they couldn't conceive of inferential capacities which could be capable of inferring a speaker's meaning that differs significantly from the meaning of the sentence she uttered. However, by proposing that human cognition is geared towards the search for relevance, Relevance theorists are able to posit inferential processes that are efficient enough to allow for a larger discrepancy between sentence meaning and speaker's meaning.

Without a maxim of truthfulness, you lose the notion that every utterance is true unless a speaker is being un-co-operative or flouting the maxim of truthfulness for effect (in the case of metaphors). Moreover, you lose the notion of a default literal interpretation. According to Relevance Theory, a hearer searches for the optimally relevant interpretation in the context, and considers possibilities in order of accessibility. There is no default literal meaning that is derived first and measured up against the context in order to see if it is appropriate.

The greater gap between sentence meaning and speaker meaning, allowed by Relevance Theory, draws into question Grice's notions 'explicit', 'literal' and 'what is said'. For Grice, speaker's meaning consists of 'what is said' (which Grice saw as the unproblematic, literal meaning of an utterance, which is decoded), and (optionally) 'what is implicated' (any implicit content which is inferentially derived in the

context). Relevance Theorists argue that this two-way distinction is too simplistic, and reject the notions of 'what is said' (literal meaning). In its place, Sperber and Wilson (1986/95) introduce the term 'explicature' (see full discussion below) to refer to the explicit content of an utterance which is arrived at by a combination of decoding and inference. In addition, they adopt Grice's notion of 'implicature' to refer to the intended, implicit content of an utterance, which is arrived at purely by inference.

This flexing of the semantic/pragmatic boundary means that Relevance Theory claims that certain phenomena, though part of the explicit content of the utterance, are derived via pragmatic inference, where others argue that they can be straightforwardly dealt with by a semantic theory (see Carston 2002: chapter 2 for a full discussion).

Indeed, a particularly interesting aspect of the current Relevance Theoretic lexical pragmatic account of figurative language (Wilson and Carston 2007; Carston 2002), which distinguishes it from a Gricean or neo-Gricean account, is that its authors argue that figurative interpretations, though inferentially derived, contribute to the explicit content of the utterance (i.e. the explicature). This is in contrast with their earlier standard Relevance Theoretic account, which like neo-Gricean accounts, claimed that figurative interpretations contributed only to the implicit content of the utterance.

In addition, rather than focusing exclusively on metaphor, Relevance Theorists claim that their lexical pragmatic approach can account for all instances in which a word is used to convey a meaning which is either broader or narrower than that which is encoded (i.e. metaphor; hyperbole; approximation; narrowing). Wilson and Carston (2007) argue that there is no clear cut off point between approximation, hyperbole and metaphor, which leaves little justification for treating them as distinct phenomena, requiring separate explanations. This, together with other *"internal descriptive and theoretical reasons"*[5] (Wilson and Carston 2007:16) motivate their pursuit of a unified account. This makes this account particularly important with respect to this thesis, as it posits the same fundamental processes and mechanisms for the comprehension of metaphors and hyperboles.

[5]See Carston 1997, 2002; Wilson and Sperber 2002; Wilson 2003 for full discussion of theoretical arguments

By proposing a unified account of narrowing and broadening (i.e. narrowing; approximation; hyperbole; metaphor), Relevance Theorists distance themselves from the general consensus to posit different processes for the different phenomena. For example, Levinson (2000) and Bluntner (1998; 2004) see narrowing as a default inference to a stereotypical interpretation, Lewis (1979) and Lasersohn (1999) have argued that approximations are the result of variations in standards of precision appropriate for different discourses, and metaphor, which gets the most attention, is among other things, considered to be a blatant flouting of a maxim of truthfulness (Grice 1975), a domain-mapping operation (Gentner and Bowdle 2008; Wolff and Gentner 2011), underlying conceptual schemas (Lakoff 1993; Gibbs 1990) or the result of the dual referential nature of terms in metaphor vehicle position (Glucksberg and Keysar 1990). In contrast, Relevance theorists argue that the processes and mechanisms for understanding metaphorical uses are the same as those deployed for all other word uses.

"They are relevance-seeking processes of forming and testing interpretive hypotheses in their order of accessibility, taking as premises the most highly activated items of encyclopaedic information, deriving implications from them, and stopping once expectations of relevance are satisfied." (Carston and Wearing 2011:2)

Below, I will summarize the basic principles and workings of Relevance Theory, before moving on to the aspects of the account that are relevant to our discussion of figurative language.

Relevance

Sperber and Wilson (1986/95) define *relevance* as a property of inputs to cognitive processes (e.g. sights, sounds, utterances). They argue that human cognition is relevance-oriented; it tends to be geared towards the "maximization of relevance". By this they mean that *"cognitive resources tend to be allocated to the processing of the most relevant inputs available…".* (Sperber and Wilson 1995: 261)

"*We are not claiming that humans always succeed in maximizing relevance, but only that they have a sufficient tendency to do so to make their massive investment in cognition evolutionarily worth while."* (Sperber and Wilson 2006:178)

Relevance Theorists claim that cognitive processing is a balancing act between '*cognitive effects'* and '*processing effort'*. An input that requires a lot of effort will be less relevant than one that does not, and the more 'cognitive effects' an input yields, the more relevant it will be. An 'optimally relevant' piece of information would be one which achieves this balance. Suppose you want to know whether to drive or walk to work, and so you ask your friend " is it raining outside?". Your friend could either answer "yes" or "no", or they could pass you their telephone, on which the weather details for today and the rest of the week are displayed on the screen. Both responses would contain all the information required, but extracting this information from the telephone screen would require more processing effort than processing your friend's utterance, which would make the second response (using the telephone) less relevant.

Cognitive effects

According to Relevance Theory, a cognitive effect is something that either **strengthens** a previously held contextual assumption, or **contradicts and eliminates** a previously held contextual assumption. For our purposes the most important type of cognitive effect is a 'contextual implication': *"An implication deducible from input and context together, but from neither input nor context alone." (*Wilson and Carston 2007:24).

A set of assumptions P contextually implies an assumption Q in the context C if and only if

i) the union of P and C non-trivially implies Q

ii) P does not trivially imply Q and

iii) *C does not trivially imply Q* (Sperber and Wilson 1986/95:109)

A contextual implication can be intended (an implicature) or unintended. An example is below in (p).

p) A: Have you seen that new French film?

B: I don't like films with subtitles.

The 'proposition expressed' (the explicature) by B's utterance is that she doesn't like films with subtitles. However, the implicature (intended contextual implication)

communicated by her utterance is that she has not seen the film that A is referring to. However, an unintended implication which A might derive from B's utterance is that B is not very cultured, or open minded when it comes to her taste in films.

Anything that inputs to a cognitive process can be relevant; sights, sounds, utterances, actions, thoughts, memories, conclusions of inferences etc. Something can be relevant in one context, but not in another. An input is relevant in a context when it interacts with that context to yield cognitive effects. New information is irrelevant in a context when it yields no cognitive effects.

The principles of relevance

Relevance Theorists argue that hearers expect speakers to be optimally relevant, and it is the assumption that the speaker will attempt to fulfill this expectation, that allows hearers to infer the speaker's intended meaning. So, in place of Grice's maxims, Relevance Theorists place *'The cognitive principle of relevance'*:

"Human cognition tends to be geared towards the maximization of relevance" (Sperber and Wilson, 1995: §3.1- 2; Wilson and Sperber, 2004: 610)

and *'The communicative principle of relevance'*:

*"*Every ostensive stimulus conveys a presumption of its own optimal relevance" (Sperber and Wilson, 1986/1995: §3.7; Wilson and Sperber, 2004: 612).

It follows from the *communicative principle of relevance* that a hearer is justified in expecting an utterance to be *optimally relevant "that it is relevant enough to be worth her processing effort, but also that it is the most relevant one compatible with the speaker's abilities and preferences"* (see Sperber and Wilson, 1995: 266-278; Wilson and Sperber, 2004: 612). According to Relevance Theory, the act of ostensive communication alone automatically communicates this *'presumption of optimal relevance'*.

Relevance Theorists claim that the two principles of relevance result in the following *Relevance- theoretic comprehension procedure:*

a. Follow the path of least effort in computing cognitive effects: Test interpretative hypotheses (disambiguation, reference resolutions, implicatures, etc.) in order of

accessibility.

b. Stop when your expectations of relevance are satisfied (or abandoned). (Wilson and Sperber, 2004: 613)

"According to this heuristic, at each point in the on-line processing of an utterance, the addressee tentatively chooses the most accessible interpretation, and reconsiders this choice only if it seems unlikely (on the basis of the available evidence) to lead to an overall interpretation that satisfies his expectation of relevance. The same procedure applies to the full range of pragmatic tasks: assigning referents to referential expressions, disambiguating ambiguous words or structures, supplying contextual assumptions, deriving implications, etc. Thus, the fact that an interpretation is highly accessible gives it an initial degree of plausibility. A hearer using this heuristic will stop at the first overall interpretation that satisfies his expectation of relevance: this is his best hypothesis about the speaker's meaning given the evidence available to him". (Wilson and Carston 2007:25)

Explicit and implicit content

As mentioned in the introduction to this account, Relevance Theorists argue that the principles of relevance not only guide the inferential processes which allow us to derive contextual implications, but also play a central role in recovering the explicit content of an utterance – in Relevance Theoretic terms, the 'explicature' of the utterance. Unlike Grice, according to RTs, the explicit content of an utterance is not limited to that which is linguistically encoded. Relevance Theorists claim that grammatical and semantic systems are responsible for decoding a 'logical form', which is not fully propositional (Carston 2004a:633), and must be fleshed out via pragmatic inference in order to arrive at the proposition expressed. Based on the logical form and the context, the hearer is able to infer the speaker's intended meaning. The speaker's intended meaning consists of explicatures and implicatures. Explicatures represent that which is explicitly expressed by an utterance and are developments of the logical form (Sperber and Wilson 1986/95:182), whereas implicatures, which represent what is implicitly conveyed by an utterance, are purely pragmatic.

Explicatures and implicatures are not the result of different pragmatic processes. Both are the result of the same inferential pragmatic process. The difference lies in the type of representation that the pragmatic processes operate on. Explicatures are based on, and therefore constrained by, the logical form of the utterance, where as implicatures are completely inferentially derived.

Relevance Theorists propose that explicatures and implicatures are 'mutually adjusted' in parallel. They are not derived sequentially, instead their on-line computation takes place in parallel through a 'backwards and forwards processing', meaning that during processing of an utterance, anticipatory expectations of implicatures could have an effect on the explicature derived, and vice versa.

"*The process may involve several backwards and forwards adjustments of content before an equilibrium is achieved which meets the system's current 'expectations' of relevance*." (Carston, 2002a: 143)

Relevance theoretic accounts of figurative language

The original account

Relevance Theorists believe that metaphors such as that in (q) are not implicit similes, as comparison account have suggested, they are processed as categorizations just as the syntax suggests – the function being to attribute properties of the metaphor vehicle to the topic.

q) Alice is a monkey

The original Relevance Theoretic account proposed that a metaphoric interpretation is part of the implicit content of an utterance and therefore, not part of the proposition expressed. This can be illustrated with the example in q).

The proposition expressed by q) would be that Alice is a monkey but "the relevance [of x)] will be established by finding a range of contextual effects which can be retained as weak or strong implicatures."[6] (Sperber and Wilson 1986/95:236)

[6] According to Relevance Theory, implicatures may vary in their strength, depending on how mutually manifest the informative intention to make manifest the assumption being implied is (see Sperber and Wilson 1986/95:39 for discussion of mutual manifestness).

" In some (perhaps many) instances, a speaker chooses to produce an utterance which is a less than literal (that is, loose) interpretation of the thought she intends to communicate. This will arise when she judges that the communication of her thought is facilitated by such a non-literal utterance, in that it makes the thought more accessible to the hearer than a literal one would, or when there isn't a literal utterance available to provide a literal means of expression of the thought" Carston 2002:331)

Sperber and Wilson (1986/95) argue that metaphors give access to an encyclopaedic schema for 'monkeys' with one or more salient and highly accessible assumption(s). In the case of q), monkeys are stereotypically mischievous creatures, and therefore if (q) is processed in a stereotypical metaphor biasing context (e.g. in which the speaker is referring to her little girl, Alice), it would yield the implication that 'Alice is mischievous'. According to the Relevance-theoretic comprehension procedure, this interpretation would be arrived at because it is the first accessible interpretation considered that satisfies the hearer's expectations of relevance in the given context.

In addition, Sperber and Wilson suggest that metaphors such as that in (q) enable speakers to convey images that depict something that a literal paraphrase could not (at least not without demanding much more processing effort). For example, (q) might convey an image of a particularly devious and cheeky monkey behaving more extremely than a typical naughty child. This observation can be traced back to Aristotle's notion of "*Bringing-before-the-eyes"*. Aristotle proposed that metaphors have the quality of making things become real and active; unperceivable things become actual and perceivable (see section 1.2 for full discussion).

However, Relevance theorists were dissatisfied with their account of metaphor (and other instances in which the speaker chooses to produce an utterance that is not intended literally, i.e. hyperbole, approximation etc.) with respect to their claims about the explicit and implicit content of a metaphoric utterance. There was a clear asymmetry between their account of 'narrowing', in which a general term (i.e. drink) is used to convey a more specific sense (i.e. drink alcohol), and 'broadening' (or loosening), in which a term (i.e. forest) is used to convey a broader meaning (i.e. any overgrown area) than that which is lexically encoded (i.e. dense area of trees). Concept narrowing had always been taken by Relevance Theorists to be one of those

pragmatic processes (such as reference assignment and disambiguation) that are involved in arriving at the explicit content of the utterance. On the other hand, concept broadening had always been seen as a process that contributed to the implicit content of the utterance.

The question arose as to why this asymmetry should exist when in all other respects the two processes of lexical adjustment appear symmetrical.

"The question of why there should be this asymmetry arises, since, on the face of it at least, these look like opposite and symmetrical processes of pragmatically constructing a new concept from an lexically encoded one: narrowing vs. broadening." (Carston 2002:334)

In fact, it is this observation that is developed into the current Relevance Theoretic account of figurative language, which provides a unified account of all instances of narrowing and broadening, in which one "*there are two possible outcomes (a narrower concept or a broader concept) of what is essentially a single process: a process of picking and choosing from among the elements of logical and encyclopaedic information that are made available by the encoded concept."* (Carston 2002:334). See section below for full discussion.

Moreover, on close analysis there is strong evidence from embedding tests, which suggest lexical broadening contributes to the proposition expresses, and thus affects the truth conditional content of the utterance. Consider the utterance in r).

r) No teenager is a **saint**[7]

It is the proposition expressed that undergoes sentence operations such as negation. Thus if it is the encoded concept SAINT which falls within the scope of the negation, then r) would be interpreted as making the irrelevant and trivial claim that no teenager has been canonized. More likely, r) would be understood as conveying the more relevant claim that no teenager is a SAINT*[8] (i.e. no teenager is a really kind, generous individual). In order to arrive at this interpretation, the adjusted concept SAINT* must fall within the scope of the negation, and must, therefore, contribute to

[7]Taken from Wilson and Carston (2007)
[8] I will use the convention of capital letters to represent an encoded concept and capital letters followed by a * to represent an occasion specific, adjusted concept (ad hoc concept).

the proposition expressed (truth conditional content).[9] It is important to highlight, that although Relevance Theorists maintain that the lexical adjustment procedure contributes to the explicit content of the utterance, that is not to say that they do not think implicatures are also conveyed by a metaphoric utterance. On the contrary, according to this account, contextual implications, both intended (implicatures) and unintended, will most likely result from the lexical adjustment process.

Consider the utterance in r) again; according to Relevance theorists, the propositional content of the utterance is 'there are no teenagers that are SAINTS*, which means that the pragmatically adjusted concept is part of the proposition expressed, but there are likely to also be many implicatures also conveyed by this utterance, which make up the entire metaphoric intended meaning (i.e. that teenagers are frequently ungenerous and self-centered individuals).

Below I will discuss the current Relevance Theoretic, unified ad hoc concept construction account, in which lexical broadening (i.e. metaphors and hyperboles) and narrowing are accounted for by one pragmatic process of lexical adjustment, which contributes to the propositional content of the utterance.

The unified concept construction account

Relevance Theorists are not alone in presenting a unified pragmatic approach to broadening and narrowing (Carston 2002; Wilson 2003; Wilson and Carston 2007; Sperber and Wilson 2006). Recanati has also put forward a well known lexical pragmatic account of non-literal language (Recanati 1995; 2001; 2004). The Relevance Theoretic account and Recanati's account differ with respect to some important fine-grained theoretical assumptions (i.e. whether comprehension procedures are purely inferential, or a mixture of inferential and associative), and the comprehension procedures they posit. However, these theoretical differences are not readily empirically testable, and are therefore not directly relevant to this thesis. More importantly for our current purposes, Recanati's and Relevance theorist's accounts both claim that when processing an utterance in which a word has been used to convey either a broader or narrower sense than that which is encoded, an occasion

[9]See Wilson and Carston 2007 and Carston 2002 for more evidence and a thorough discussion.

specific concept is constructed on-line which denotes either a broader or narrower category than the lexically encoded concept. This claim is open to empirical investigation, and will, therefore, be one of the main foci of discussion throughout this thesis. From here onwards, I will only explicitly discuss the Relevance Theoretic account. However, any conclusions drawn will (unless otherwise specified) ipso facto apply to Recanati's unified lexical pragmatic account (at least on this point) due to their shared empirically testable claim. See endnote[i] for a brief discussion of the specifics of Recanati's account, and the similarities and differences between the Relevance theoretic and Recanati's accounts.

The current Relevance Theoretic account of figurative language states that the pragmatic process involved in figurative language interpretation take place at the lexical level, rather than at the sentence level, and that that lexical pragmatic process contributes to the explicature of the utterance (Wilson and Carston 2007; Sperber and Wilson 2006; Carston 2002). The same principles of relevance (as those detailed above) guide comprehension, and the same comprehension procedure is followed. However, rather than the metaphoric interpretation being part of the implicit content of the utterance, which is entirely inferentially derived (as was claimed in the original Relevance Theoretic account, and by Grice), the current lexical pragmatic account claims that the lexical adjustment procedure contributes to the explicit content of the utterance. The occasion specific interpretation of various pragmatic phenomena (e.g. narrowings, approximations, loose uses, metaphors, hyperboles etc.) involves the construction of an '*ad hoc concept'* or 'occasion-specific sense' in place of the encoded vehicle concept, based on an interaction between the encoded topic and vehicle concepts, contextual information and expectations of relevance.

This term originates in the work of Lawrence Barsalou (1987; 1992) in which he illustrated that in different contexts and for different purposes, people can incorporate different information from long-term memory (encyclopaedic entries) to form distinct concepts for a single category. For example, in one context, the category of cats is conceptualized as having the property 'chase birds', whereas in other contexts it isn't. Moreover, for some purposes the property 'winners and losers' is taken to be central to the concept SPORTS, for other purposes the property is absent completely from this concept, or is demoted in importance.

Carston (2002) argues that from a Relevance theoretic point of view, it makes sense that such concept adjustment capacities are made use of during communication.

"*It is hardly surprising that this capacity is exercised in communication and interpretation, where it is given the extra impetus and direction of the presumption of relevance, so that any required construction of concepts is guaranteed to be relatively easy to achieve (low in processing cost) and to have a satisfactory array of cognitive effects."* (Carston 2002:322)

Relevance Theorists claim that words are frequently used to convey either a broader or narrower sense than that which is encoded. They argue that a wide range of phenomena can be explained by appealing to this notion of lexical adjustment; narrowing or broadening of the encoded concept.

Narrowing

Lexical narrowing involves the use of a word to convey a more specific sense. Case of narrowing are in (s, t and u).

s) All young professionals **run**

t) I don't have **time**

u) I really need to get a **life**

In different contexts, this utterance could be understood as conveying different senses. The speaker could intend to communicate that 'all young professionals engage in the action of running at some point in their lives (e.g. to catch a ball, or to catch the bus). However, in most contexts this interpretation would not satisfy the hearer's expectation of relevance, it is highly likely that most people already hold the assumption that most people (provided they are able bodied) engage in the act of running at some point in their lives. In most contexts, in (s) the lexical item 'run' which encodes a concept which denotes the action of running, is being used to convey a more specific sense; something along the lines of 'engage in the vigorous activity of carrying out that action [of running] for a prolonged period on a regular basis for exercise'. This interpretation would most likely satisfy the hearer's expectation of

relevance as it would provide a new piece of information, which would either strengthen an existing assumption, or generate a completely new assumption.

Lexical narrowing comprehension procedure

The lexical narrowing comprehension procedure would be as follows:

In this specific context, based on the presumption of relevance and informed by the logical form and relevant contextual information, the hearer constructs an ad hoc concept RUN* out of the encyclopaedic and logical information associated with the lexically encoded concept RUN, which has a narrower denotation than that of the encoded concept RUN (i.e. only denotes 'engaging in the vigorous activity of carrying out that action [of running] for a prolonged period on a regular basis for exercise'). See the discussion of lexical broadening below, for a more thorough breakdown of the comprehension procedure followed during the lexical adjustment procedure.

The narrowing in (u) illustrates that narrowing can take place to lesser or greater degrees, and also in different directions. In different contexts the speaker might be understood differently. They might be conveying that they need to get an interesting or exciting life, or in another context their utterance might be understood as communicating that they need to engage with the practicalities of life; stop having so much fun, and settle down.

Broadening

Lexical broadening involves the use of a word to convey a broader sense than that which is encoded. Phenomena that Relevance Theorists (Sperber and Wilson 2006; Wilson and Carston 2007) claim can be accounted for by lexical broadening include metaphor, hyperbole, approximation, and other loose uses[10]. They argue that these phenomena are distinguished only by the degree to which the encoded concept is broadened. Approximations, they argue, are instances in which a strict sense is "*marginally extended to include a penumbra of items (what Lasersohn (1999) calls a pragmatic halo) that strictly speaking falls outside its linguistically specified*

[10]Relevance Theorists also explain category extensions and neologisms using this lexical pragmatic account.

*denotation." (*Wilson and Carston 2007:8). Hyperboles involve a greater broadening of the encoded concept, which gives the impression of 'exaggeration', and metaphors involve the greatest broadening of all.

"We suggested…that 'approximation', 'hyperbole', 'metaphor' are not distinct theoretical kinds, requiring different interpretive mechanisms, but merely occupy different points on a continuum of degrees of broadening" (Wilson and Carston 2007:29).

An example of each phenomenon is given in s-u below.

Approximation

v) The water is **boiling**

Hyperbole

w) This house is a **palace**

Metaphor

x) John is a **clown**

A speaker could utter (w) hyperbolically with the intention of conveying that they think said house is huge, and luxurious. In which case, the hearer would construct an ad hoc concept PALACE* which has a broader denotation than the encoded concept PALACE, such that it includes in its denotation large family homes, which are nicely decorated.

A speaker intending (x) metaphorically would be conveying that they think John is a foolish silly character (i.e. he exhibits features associated with clowns). In order to accurately interpret (x) metaphorically, the hearer must construct an ad hoc concept CLOWN* which denotes a broader category of things than the encoded concept CLOWN. Silly, foolish people would be in included in the denotation of the ad hoc concept, whereas they would have fallen outside of the denotation of the lexically encoded concept CLOWN.

Examples (y) and (z) illustrate the encoded concept in the same utterance can be broadened to a lesser or greater degree in order to satisfy the hearers expectation of relevance in different contexts.

y) The film made me **sick**

z) That book **puts me to sleep**[11]

In (y), the speaker could be understood as communicating that she actually came close to vomiting during or after watching the film (i.e. the encoded concept is only marginally broadened), or she could be understood as conveying that it made her feel a little nauseous (i.e. the encoded concept is extended further), or she could be conveying that she was made to feel a little uncomfortable by the film (i.e. an even further broadening of the encoded concept). The intuition that an utterance is either an approximation, a hyperbole, or a metaphor results from the degree to which the encoded vehicle concept has been broadened (i.e. the particular sub set of encyclopaedic properties/features used to construct the ad hoc concept). The occasion specific concept constructed when interpreting an approximation will share a larger number of encyclopaedic properties/features with the encoded concept, than the ad hoc concept constructed when interpreting a hyperbole. The lexical adjustment will be even bigger in the case of metaphors.

In all instances of narrowing and broadening, the logical form together with the contextual information and the presumption of relevance inform the lexical adjustment process.

Lexical broadening comprehension procedure

According to Wilson and Carston (2007:27), lexical broadenings (including metaphors and hyperboles) would be interpreted via the following comprehension procedure (illustrated using the metaphor in u):

The hearer decodes the sentence uttered, which encodes the concept CLOWN. This encoded concept activates a range of logical properties (e.g. a clown is a FOOLISH

[11]Taken from Wilson and Carston (2007)

AND AMUSING CHARACTER), which enable deductive inferences to be drawn. For example, from the proposition that John is a CLOWN, it is deducible that John is a foolish and amusing character. In addition, a variety of encyclopaedic properties associated with the concept CLOWN are activated (e.g. colourful, funny, clumsy, foolish). In a discourse context in which the hearer is expecting an answer about whether John is an appropriate person to pick for a position of responsibility, encyclopaedic properties to do with character and sensibility (e.g. foolish, funny, clumsy) are likely to receive additional activation, and would thus be the most accessible in the context. The surrounding linguistic content (i.e. the other words in the utterance) will also have an effect on activation levels of encyclopaedic properties associated with the encoded concept. For example, in the metaphor 'The politician's speech was noxious', the 'topic' of the metaphor 'The politician's speech' would prime particular encyclopaedic properties of the encoded concept NOXIOUS (e.g. unpalatable, distasteful, dangerous). Features associated with the concept NOXIOUS which could not be applied to 'the politicians speech' would not be highly activated.

Based on the relevance theoretic comprehension procedure, the hearer "tentatively assumes" that among the implicatures conveyed by the metaphoric utterance are the following:

1. John is a foolish and clumsy person

2. John is not always responsible and trustworthy

3. John would not be a good person to place in a position of responsibility.

In a context in which John is evidently not a real clown, the encoded concept CLOWN needs to be broadened in order for these implicatures to be justified. An ad hoc concept CLOWN* is constructed from the encyclopaedic properties associated with the encoded concept CLOWN. Some 'content constitutive' feature(s) (e.g. the feature ENTERTAINER) associated with the encoded concept will not be included in the ad hoc concept. The dropping of content constitutive features of the encoded concept results in the denotation of the ad hoc concept including foolish, funny and clumsy people (individuals who share some of the encyclopaedic properties associated with the encoded concept CLOWN), as well as actual clowns. Having

arrived at an interpretation that satisfies their expectation of relevance, the hearer would stop the search.

The comprehension procedure detailed above nicely illustrates Relevance Theorists notion of 'mutual parallel adjustment' discussed above.

"…tentative hypotheses about contextual assumptions, explicatures and contextual implications are incrementally modified so as to yield an overall interpretation which satisfies the hearer's expectations of relevance" (Wilson and Carston 2007: 28)

According to Wilson and Carston (2007), the hearer begins his or her search for an interpretation that will satisfy their expectations of relevance, in doing so they tentatively accept a set of implicatures, while looking for an interpretation of the metaphor vehicle, which will allow them to accurately infer those implicatures. Forward and backward inferences are required: The tentatively accepted implicatures are arrived at via forward inferencing from the premise that John is a CLOWN (combined with relevant contextual information), while backward inferencing, based on those implicatures, yields the adjusted proposition expressed John is a CLOWN*.

Rejecting the notion of a default literal interpretation

As this account proposes that the ad hoc adjusted concept contributes to the proposition expressed by the figurative utterance, a fully-fledged proposition containing the encoded concept (e.g. CLOWN) is never processed. The encoded concept is 'accessed' as part of the incomplete logical form which is decoded from the utterance, and the encyclopaedic properties/features associated with that concept are searched through in order to find those which are accessible and relevant enough to constitute the ad hoc, occasion specific concept under construction. Where Grice believed 'literalness' to have priority at the utterance level, Wilson and Carston (2007) argue that 'literalness' only has priority at the local level of words, not at the global level of the utterance.

With respect to the Relevance Theoretic arguments for a truth-conditional lexical pragmatics, the Relevance Theoretic account not only diverges radically from other pragmatic accounts (which are based on the Gricean assumption that metaphoric interpretations are implicitly communicated), but also draws into question Davidson's

(1978) philosophical arguments for metaphoric effects lying outside of the semantic content of an utterance. If one posits inferential capacities as efficient as those posited by Relevance Theorists, then as Relevance theorists have done, it is possible to argue that the output of inferential, pragmatic processes contribute to the truth-conditional content of an utterance (the semantic content). Their account in which the boundary between semantics and pragmatics has been shifted, entails the radical claim that the input to the inferential comprehension procedures that they posit, is a set of 'incomplete logical forms', which are then fleshed out into fully propositional forms (the proposition expressed).

"the input to the system for utterance comprehension is a set of logical forms (and a set of procedural constraints), which have been decoded by the language processing system. The logical forms are often highly schematic conceptual structures, functioning as mere templates for the construction of fully propositional forms. The output of the pragmatic comprehension system is a set of assumptions or propositional forms, explicatures, and implicatures, which constitute 'what is communicated' or speaker meaning." (Carston 2002:64)

The rejection of the notion of a default literal interpretation, and the positing of a parallel processing model means that the Relevance Theoretic account avoids falling foul of empirical evidence, which suggests that a) a literal interpretation of a figurative utterance does not need to be arrived at before an alternative non-literal interpretation can be inferred, and b) metaphoric interpretations are available right from the beginning of processing (Inhoff et al. 1984, Blasko and Connine 1993, Ortony et al. 1978, Blasko and Connine 1993, Glucksberg et al. 1982, McElree and Nordlie 1999). See section 2.1.1 for a full discussion of these findings.

Dual-direction adjustment during metaphor interpretation

Wilson and Carston (2007; Carston 2002) claim that metaphors can encode a concept which must be narrowed as well as broadened in order to arrive at an interpretation which satisfies the hearer's expectations of relevance. Take the example in (a2).

a2) The dog is a **monster**

In a context in which the dog in question has just attacked a defenseless child, the concept MONSTER must be narrowed to denote only those monsters that are vicious and aggressive, excluding friendly monsters such as those featuring in the film 'Monsters inc.', as well as broadened to include dogs which exhibit traits associated with MONSTERS.

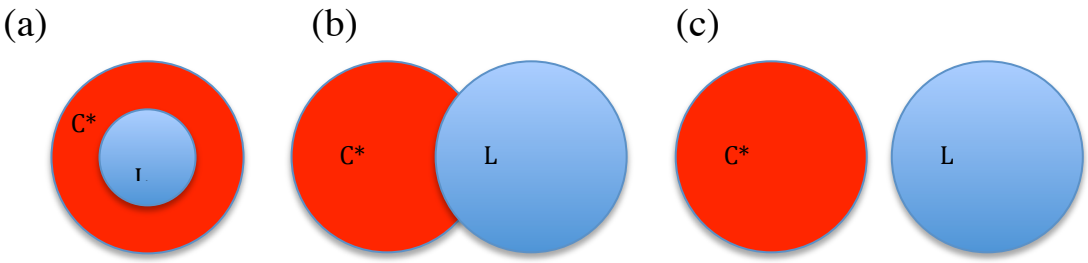
"In the discourse context ["will she look after the children if we get ill?" – "Sally is an Angel"], the most accessible adjustment of the encoded concept ANGEL……is the ad hoc concept ANGEL, which is narrower than ANGEL in some respects, and broader in others…….Both narrowing and broadening emerge as by-products of the search for relevance, and the same encoded concept may be narrowed or broadened (or both) to different degrees and in different ways across different occasions of use"* (Wilson and Carston 2007:29)

Wilson and Carston (2007) do not, however, argue that such dual directional lexical adjustment is a defining feature of metaphor. Instead they simply observe that metaphors can require both narrowing and broadening of the encoded vehicle concept. In contrast, Carston and Wearing (2011) have put forward a discontinuity account of metaphor in which they propose that metaphor interpretation, like approximation, hyperbole and narrowing, does indeed involve the lexical pragmatic process of ad hoc concept construction, but that it is unique with respect to the fact that it by definition requires lexical adjustment in both directions: narrowing and broadening. Carston and Wearing (2011) argue that dual directional lexical adjustment is a defining feature of metaphor interpretation, which sets it apart from other tropes such as hyperbole and approximation.

"….metaphorical use inevitably involves concept narrowing as well as broadening. So while the denotation of the ad hoc concept communicated by a hyperbolic use is simply more inclusive than that of the original lexical concept, the denotation of the ad hoc concept derived on a metaphorical use either merely overlaps with the denotation of the encoded concept or is entirely disjoint from it". (Carston and Wearing 2011:11).

Carston and Wearing (2011) illustrate their claim with the following diagram:

L = linguistically encoded concept; **C*** = pragmatically-derived concept



Hyperbolic loose use ***Metaphoric use (broadening and narrowing)***

Carston and Wearing use hyperbolic similes to motivate their claim. The many examples in which metaphor and hyperbole co-occur (as in b2 and c2) are often used as support for the idea that the two tropes lie on a continuum.

b2) You are a saint

c2) You are a pig

"A great many conversational metaphors seem to be simultaneously hyperbolic in this way, especially in their frequent use as devises for blaming/insulting or praising/complenting". (Carston and Wearing 2011:10).

However, Carston and Wearing point out that simile and hyperbole also frequently co-occur (i.e. the metaphors in r and s could easily be converted into the similes in d2 and e2). Yet similes do not involve any lexical adjustment of the vehicle term (Instead, Carston and Wearing claim that it is a loosening of an encyclopaedic property of the literal encoded concept that produces the hyperbolic quality of the utterance).

d2) You are like a saint

e2) You are like a pig

"Just as there are hyperbolic similes without there being any loose use continuum between hyperboles and similes, so, we suggest, there are hyperbolic metaphors without this indicating that there is a continuum between hyperboles and metaphors (the only difference between them being in the degree and/or direction of loosening). In short, the co-occurrence of these figures doesn't weigh in favour of a hyperbole-metaphor continuum." (Carston and Wearing 2011:11)

Carston and Wearing's discontinuity account does not refute the notion of a unified account of figurative language. According to their account, all figurative interpretations are still the result of the same lexical adjustment procedure, and both narrowing and broadening still contribute to the proposition expressed by an utterance (the truth-conditional content). In fact, Carston originally put forward this observation of bi-directional lexical adjustment in metaphors in her (2002) book, as an additional argument for a unified account of narrowing and broadening. She argued that if some interpretations result from a narrowing as well as a broadening of the lexically encoded concept then this is further motivation for a unified account with respect to the processes contributions to the proposition expressed.

"The fact that both processes might be required in forming a communicated ad hoc concept makes it look all the more likely that they both contribute to the proposition expressed". (Carston 2002:344)

From concept construction to disambiguation

Wilson and Carston (2007) argue that some lexical adjustments can be one-off processes, never to be repeated again, meaning that the ad hoc concept constructed will be*" tied to [that] particular concept that may never occur again"* (Wilson and Carston 2007:14). However, within groups and communities, some ad hoc constructed senses catch on and are frequently used. In such cases, the frequency of use can lead to a metaphor vehicle gaining additional sense[12].

"*In such cases, the pragmatic process of concept construction becomes progressively more routinized, and may ultimately spread through a speech community and stabilize as an extra lexical sense."* (Wilson and Carston 2007)

Once a metaphor vehicle has become polysemous in this way, it is likely be processed as an ambiguous word, thus requiring disambiguation (another pragmatic process that Relevance theorists consider to contribute to the truth conditional content of an utterance), rather than ad hoc concept construction.

[12]Relevance Theorits argue that their lexical pragmatic account could provide insights into the processes underlying polysemy and language change (Wilson and Carston 2007:15)

Summary of the Relevance theoretic account

Human cognition is geared towards relevance

Relevance Theory is an inferential model of communication in which successful communication requires expressing and recognizing intentions. Relevance theorists argue that human cognition is geared towards the search for relevance, and it is this that allows our inferential capacities to be efficient enough to derive speakers' meanings without a set of maxims or a co-operative principle (such as those posited by Grice 1967).

Figurative interpretations contribute to the proposition expressed

They argue that utterance meaning is a combination of the explicit content of the utterance (the explicature) and any additional implicatures conveyed by the utterance in a given context. They argue that the explicit content of an utterance is arrived at by a combination of decoding and inference, whereas implicatures are arrived at purely by inference. Thus, the output of certain pragmatic processes (i.e. reference assignment and disambiguation) contribute to the proposition expressed. Importantly, for the purposes of this thesis, one of those pragmatic processes is lexical broadening, which is the process that allows us to interpret novel figurative utterances in which a word is used to convey a broader sense than that which is encoded (i.e. my lawyer is a shark).

A unified concept construction account

The current Relevance Theoretic, lexical pragmatic account of figurative language claims that metaphor is a type of 'loose use of language' comparable to various other phenomena usually discussed in other terms (e.g. approximations and hyperboles), and that all such instances in which a word is used to convey a broader sense than that which is encoded, as well as those cases in which a word is used to convey a narrower sense than that which is encoded, are processed in the same way. They argue that both narrowings and broadenings result from a general pragmatic process of 'concept adjustment' (Carston 2002; Wilson and Carston 2007), which contributes to the explicit content of the utterance.

Though committed to the unification of all instances of narrowing and broadening

under one mechanism of concept adjustment, Relevance Theorists Carston and Wearing (2011) have put forward an account in which they separate out a distinct natural class of cases within the unified account. They argue that metaphor cannot be completely conflated with other tropes such as hyperbole, because metaphoric interpretations are distinct from hyperbolic or approximate interpretations due to the fact that the lexically encoded vehicle concept has been narrowed as well as broadened.

Relevant and irrelevant information

According to this account, in a metaphor-biasing context, the metaphor irrelevant features associated with the lexically encoded vehicle concept will not be considered during interpretation, and will therefore lose activation.

There is no default literal interpretation

As the Relevance Theoretic account proposes that the ad hoc adjusted concept contributes to the proposition expressed by the figurative utterance, a fully-fledged proposition containing the encoded concept (e.g. CLOWN) is never processed; there is no default literal interpretation of an utterance, which means that the current Relevance Theoretic account does not fall foul of empirical data that goes against the three-stage Neo-Gricean processing model (see 2.1.1 for full discussion of the relevant findings).

Familiar vs. novel metaphors

Wilson and Carston (2007) argue that within groups and communities, some ad hoc constructed senses catch on and are frequently used. In such cases, the frequency of use can lead to a metaphor vehicle gaining additional sense. Once a metaphor vehicle has become polysemous in this way, it is likely be processed as an ambiguous word, thus requiring disambiguation, rather than ad hoc concept construction.

Below, I will discuss another account that is based on the assumption that metaphor comprehension involves the use of stable, lexically encoded concepts and the construction of ad hoc, occasion specific ones.

1.6.2 CLASS-INCLUSION ACCOUNT OF METAPHOR

Like the Relevance Theoretic account, Sam Glucksberg and Boaz Keysar's (1990) Class- inclusion account of metaphor is a property attribution/categorization model, in which it is posited that an occasion specific concept is constructed on-line, during interpretation.

f2) My lawyer is a shark[13]

The class-inclusion account holds that when producing a metaphor such as that in (f2), a speaker intends to categorize an object or entity (the topic, e.g. 'lawyer'), within an occasion specific category (e.g. VICIOUS AND TENACIOUS THINGS) in order to attribute the properties of that ad hoc category (e.g. 'vicious' and 'tenacious') to its new member – the topic. The metaphor vehicle (e.g. 'shark') is chosen by the speaker because it is a good exemplar (a prototypical member) of the ad hoc category in which they intend to categorize the topic.

The concept construction process – differing contributions from the topic and vehicle

The theory proposes that in any given metaphoric context, vehicle terms have "dual reference". By this, it is meant that metaphor vehicles denote two different categories; a superordinate category and a basic-level category. For example, in the case of (f2) the word 'shark' refers both to the basic-level category LARGE FISH (an object or entity), and to the superordinate category VICIOUS AND TENACIOUS THINGS (a type).

During comprehension, the hearer must construct an appropriate 'ad hoc' superordinate category based on the 'local context'. The topic and the vehicle are used to determine the superordinate category that the vehicle is referring to in that particular context. The vehicle provides 'properties for attribution' to the topic. It is

[13]Taken from Glucksberg 2001

by virtue of manifesting these properties, that the vehicle is an exemplar of the superordinate category being constructed, which is why it is chosen as an appropriate metaphor vehicle by the speaker. The topic provides 'dimensions of attribution: a set of dimensions along which it might be characterized which are relevant to the vehicle. Vehicles instantiate many properties, and topics can be characterized in many ways but only those properties of the vehicle that fit the dimensions of attribution of the topic, which in turn are relevant to the vehicle, are considered when constructing the ad hoc superordinate category.

According to this account, when a term is being used as a metaphor vehicle, and is referring to the superordinate category, the metaphor irrelevant features associated with the basic-level category will not be considered during interpretation, and will therefore lose activation.

Like relevance-theorists, Glucksberg and Keysar see metaphors as categorization statements, not as implicit similes in which the topic and the vehicle concepts are compared in the search for similarities. However, this is where the parallel with Relevance Theory stops. According to the class-inclusion account, rather than both inputting to a comparison process, metaphor 'vehicles' and 'topics' play different but interactive roles – A metaphor topic provides dimensions for attribution, while a metaphor vehicle provides properties to be attributed to the topic. Glucksberg is quick to point out, though, that this does not mean that the relationship between the topic and vehicle concept is not considered.

"Note, this does not preclude a comparison process in which the metaphor vehicle is assessed vis-à-vis information available in the metaphor topic. The claim is that the properties per se of the topic and vehicle are not the appropriate inputs to the comparison process. Instead, vehicle properties on the one hand and topic dimensions on the other are the relevant inputs for comparison, analogous to the slots and fillers of head nouns and modifiers in conceptual combinations" (Glucksberg 2001 p. 53-54).

"A first step is alignment of the vehicle and the topic concepts so that dimensions of attribution of the topic can be matched against candidate properties of the vehicle" (Glucksberg 2001.p. 54)

"The properties of a metaphor vehicle that are attributed to the topic are determined by two criteria: (a) the higher-order category (or categories that the vehicle may exemplify, and (b) whether the prototypical properties of that category characterize the topic in a meaningful way" (Glucksberg 2001. p.55).

In short, Glucksberg also posits an early alignment procedure, but the topic and vehicle input different things to the alignment; the topic's dimensions of attributions are aligned with properties of the vehicle.

The relationship between the topic and vehicle during figurative language comprehension

Glucksberg argues that although the semantic relationship between the vehicle and topic concepts is not considered (the concepts are not compared, and neither are features mapped from one to the other), topics do vary in terms of the level of constraint they place on interpretation due to how many relevant (to the vehicle) dimensions of attribution they provide. He proposes that topics are either high or low-constraining.

"High-constraining topics produce limited expectations about how they might be characterized, where as low-constraining topics produce relatively unlimited expectations about how they might be characterized" (Glucksberg 2001:54).

For example 'lawyer' would be a high-constraining metaphor as there are relatively few dimensions on which lawyers can be characterized i.e. cost, reputation, temperament, ethos, skill, experience etc. It is unlikely that any lawyer would be characterized as a lawyer based on dimensions that are irrelevant to law, such as their health, their eye colour or their diet. 'My friend' on the other hand would be a low-constraining topic as there are a multitude of dimensions on which I could characterize her. Glucksberg argues that it is how constraining the topic is, along with how good an exemplar the vehicle term is of the properties the speaker intends to attribute, which determines how apt a metaphor is.

Novel vs. Conventional metaphors

Glucksberg (2001) states that his account is of **novel** metaphor comprehension, but that the process is not all that different in the case of conventionalized metaphors. He argues that as a result of frequent use, metaphor vehicles move from being good exemplars of an ad hoc category, to become prototypical members of that category. In such instances, they may lexically encode the 'ad hoc category', meaning that processing will involve concept selection as opposed to the concept construction process posited for novel metaphor interpretation. However, Glucksberg (2001:99) argues that those vehicles would still be *"....actively instantiated in different and sometimes novel ways for different topics. Thus, understanding my surgeon is a butcher entails a different construal of the category of incompetent, bungling people than does understanding my carpenter is a butcher."*

Beyond default 'literalness'

Like the Relevance Theoretic account, and in line with empirical evidence discussed in section 2.1.1, the class-inclusion account does not require metaphoric utterances to have a global literal interpretation that must be arrived at first. In fact, Glucksberg's account does not draw upon a literal/non-literal distinction; the context dictates whether the vehicle term refers to the superordinate or basic-level category.

"...figurative language involves the same kinds of linguistic and pragmatic operations that are used in ordinary, literal language." (Glucksberg (2001): preface)

Hyperbole

The class-inclusion account makes no claims about hyperbole. However, we can speculate that such an account would predict that hyperboles of the kind X is Y (e.g. *earl grey tea is noxious*) would trigger the same comprehension processes as either metaphors of the same form or literal class-inclusions. Both are instances in which the vehicle term is being used to refer to a superordinate category, rather than a basic level category.

For example, the word 'noxious' can refer to the basic-level category HARMFUL, POISONOUS, AND TOXIC SUBSTANCES, but it can also refer to a superordinate category; the exact nature of the superordinate category is determined by the

dimensions of attribution provided by the topic of the statement, and it is this relationship between the topic and vehicle which determines whether the statement is hyperbolic or metaphoric. In a metaphoric context as in (g2), the superordinate category referred to by 'noxious' would be something along the lines of DISTASTEFUL AND POTENTIALLY DANGEROUS THINGS, whereas in a hyperbolic context as in (h2), the superordinate category referred to by 'noxious' would be more like DISGUSTING, UNPALATABLE THINGS.

g2) The politician's speech was noxious

h2) The earl grey tea was noxious

In short, I am arguing that the class-inclusion account, though posited as an account of metaphor alone, is also equipped to account for hyperbolic statements. In fact, I would argue that the specifics of the account entail that hyperbolic statements must be accounted for by the same comprehension procedure.

Glucksberg argues that the 'recognition of dual reference' is a necessary signal of metaphoricity, but in light of the above claim that hyperboles must also be accounted for by the class-inclusion account, perhaps this should be re-phrased as 'recognition of dual reference is a necessary signal of figurativeness'.

Summary

Dual reference

Like the Relevance theoretic account, according to the class-inclusion model, metaphoric statements are true class-inclusion assertions. However, according to Glucksberg's and colleagues account in it is the 'dual reference' of the metaphor vehicle that allows for interpretation. The metaphor vehicle not only has its usual denotation, but also refers to a broader ad hoc category. In a metaphoric context the metaphor vehicle gives name to a new category, which is constructed on-line, while its salient properties become prototypical of that category. Those prototypical properties are then attributed to the topic of the metaphor.

Relevant and irrelevant information

According to this account, when a term is being used as a metaphor vehicle, and is referring to the superordinate category, the metaphor irrelevant features associated with the basic-level category will not be considered during interpretation, and will therefore lose activation.

No default literal interpretation

Like the Relevance Theoretic account, and in line with empirical evidence discussed in section 2.1.1, the class-inclusion account does not require metaphoric utterances to have a global literal interpretation that must be arrived at first; the context dictates whether the vehicle term refers to the superordinate or basic-level category.

Familiar vs. novel metaphors

Glucksberg (2001) states that his account is of novel metaphor comprehension, but he argues that as a result of frequent use, metaphor vehicles can transition from being good exemplars of an ad hoc category, to become prototypical members of that category. In such instances, they may lexically encode the 'ad hoc category' meaning that processing will involve concept selection as opposed to the concept construction process posited for novel metaphor interpretation.

Natural extension to include hyperbole

The class-inclusion account, though posited as an account of metaphor alone, is also equipped to account for hyperbolic statements. In fact, I argue that the workings of the account entail that hyperbolic statements must be accounted for by the same comprehension procedure.

In the next section, I will discuss Rachel Giora's pragmatic account, which like Relevance theory, claims that successful utterance interpretation results from a cognitive bias. However, rather than a bias towards relevance, a bias towards salience is posited.

1.6.3 GRADED SALIENCE HYPOTHESIS AND METAPHOR

Rachel Giora (1997,1999,2002,2003) proposes an alternative pragmatic account to Grice and Relevance Theory. Like all pragmatic accounts it aims to explain how meanings are arrived at in context, given the fact that speaker meaning is vastly underdetermined by sentence meaning. However, the Graded Salience Hypothesis (GSH) argues that it is salience rather than a cooperative principle and maxims, or a principle of relevance, which determines the initial processes involved in utterance comprehension. She argues that the most salient meaning is initially accessed, and only if it does not fit the context, does further processing take place.

Salience

Giora argues that to be salient, meanings of words or utterances must be *"stored or coded in the mental lexicon…..stored information is superior to un-stored information such as novel information or information inferable from context: while salient information is highly accessible, non-salient information requires strongly supportive contextual information to become as accessible as salient information"* (Giora 2003:15). The most salient information is that which is also prominent due to being conventional, familiar, and/or frequently used. Coded meanings that are less familiar or less frequent, are less salient, and meanings that are not encoded in the mental lexicon (meanings constructed on the fly) are non-salient.

Giora (2003) clarifies that salience is not a property that is held or not held, instead it is a gradient. The more familiar, conventional or stereotypical the information is, or the more frequently it is used, the more salient it will be.

Giora claims that in processing terms (at least), there is no such thing as a literal/non-literal distinction. If two utterances, one generally considered to be 'literal', and the other 'non-literal', converge in degree of salience (i.e. 'The lemon is yellow' and 'You are an angel'), then they are initially processed in exactly the same way. However, if those two utterances diverge in degree of salience (i.e. 'the lemon is yellow' and 'my husband is a curtain'), then they will be processed differently. In the case of both utterances, the most salient meaning(s) will be accessed first, but the unfamiliar utterance will require additional processing, due to the salient meaning

(that my husband is a cloth drape which hangs in front of the window) being contextually inappropriate.

Metaphoric utterances

Sequential or non-sequential processing

According to the Graded Salience Hypothesis, in the case of a familiar metaphor, both the 'literal' and the metaphoric meanings are equally salient, which means that both the 'literal' and the metaphoric meanings of such metaphors will be initially accessed in both metaphor and literal biasing contexts. Giora (1997; 1999) recognizes that context does play a role in the sense that salience can be affected by the preceding or surrounding context, but she believes that role to be limited, and that it is unable to trigger the suppression of other highly salient meanings which are not primed by the context.

In contrast with other accounts, such as Wilson and Carston (2007), Glucksberg and Keysar 1990) or Clement and Gentner (1991), and with her own account of familiar metaphors, Giora argues that less familiar metaphors do involve a sequential 'literal first' process, as novel metaphors have only one salient meaning – the literal one. In such instances, the literal meaning is evoked first and rejected on the basis of poor contextual fit before the less salient metaphoric meaning is activated.

Therefore, with respect to familiar metaphors, the Graded Salience Hypothesis is in line with empirical evidence which does not support a 'literal first' account, as according to the Graded Salience Hypothesis, salient meanings are accessed first, and both 'literal' and 'metaphoric' meanings are equally salient (Inhoff et al. 1984, Blasko and Connine 1993, Ortony et al. 1978, Blasko and Connine 1993, Glucksberg et al. 1982, McElree and Nordlie 1999). However, Giora still proposes a 'literal first' account for novel metaphors, which do not fit with these findings.

The retention/suppression hypothesis

The Graded Salience Hypothesis states that in the case of conventional metaphors (in which both the 'literal' and 'non-literal' meanings are initially activated), and in less familiar metaphors (in which the less salient metaphoric meaning is accessed after a delay in which the salient 'literal' meaning is accessed and rejected), the contextually

incompatible 'literal' meaning is not discarded in a metaphor biasing context, provided it plays a role in the construction of the compatible meaning, and that it does not 'disrupt' the derivation of the compatible, metaphoric interpretation. For example, the salient 'literal' meaning of 'rubbish dump' which denotes a public area in which people dispose of their waste, would be retained in a metaphoric context (e.g. my house is a rubbish dump), as it has played a role in the construction of, and does not conflict with the compatible, metaphoric meaning.

In contrast, when processing a familiar metaphor in a literal biasing context, the incompatible, metaphoric meaning (which was initially accessed at the same time as the equally salient 'literal' meaning) would be suppressed[14], as it interferes with arriving at the compatible 'literal' interpretation.

According to Giora then, suppression does not necessarily take place during metaphor processing. However, when processing any literal utterance that also has a 'non-literal' interpretation, it is usually necessary to suppress the metaphoric interpretation which is automatically activated at the same time as the appropriate literal meaning.

i2) He was disarmed

Giora argues that extremely apt metaphors such as that in (i2), are the exceptions to this rule, as the 'literal' (dispossess someone of their weapon) and 'figurative' (charming someone out of their animosity) meanings are so closely related, that the 'metaphoric' meaning does not conflict with the 'literal' meaning, and thus, does not need to be suppressed.

"*Comprehension involves an initial phase in which contextually appropriate and salient meanings are activated- the latter automatically and independently of contextual information, the former as a result of a predictive context, and an immediate subsequent phase of integration in which the activated meanings are either retained for further processes or suppressed as contextually disruptive."* (Giora 2003:38)

[14] The activation level would be reduced (see section or full discussion of the mechanism of suppression)

Aptness

The Graded Salience Hypothesis entails that figurative statements pertaining to highly salient features of a vehicle concept are easier to process than those pertaining to less salient features of the same vehicle concept. For example, the statement 'It had been his duvet for years' preceded by the context 'Jimmy didn't want to go to secondary school and leave his lovely comforting primary school behind' would be easier to process than the same statement preceded by the context 'Jimmy was sad when one of his oldest ducks on the farm died', because although the metaphor relevant features in the second example 'feathery' and 'old' could indeed be associated features of the concept DUVET, they are perhaps not as salient as the features 'comforting' and 'protective', which are the relevant features in the first example. Thus, the first metaphor would be more 'apt' (easy to process) than the second[15].

Hyperbolic utterances

As with Glucksberg, Giora does not explicitly discuss hyperbole. However, it is reasonable to speculate that the Graded Salience Hypothesis would account for hyperboles of the type X is Y in the same way as it accounts for metaphors of the same type. Furthermore, the Graded Salience Hypothesis is a general account of language comprehension, not just of metaphor, hence, the premise that salience determines initial processing is applied to all types of utterances. Presumably, in the case of familiar hyperboles, both salient 'literal' and 'hyperbolic' interpretations are activated, with no subsequent suppression taking place. However, in the case of unfamiliar hyperboles, only one salient 'literal' meaning would be activated, necessitating further processing triggered by the rejection of this salient meaning based on lack of contextual fit.

Summary

Salient first

The Graded Salience Hypothesis argues that it is salience rather than the flouting of maxims or a principle of relevance, which determines the initial processes involved in

[15]Thanks to Rachel Giora for helpful discussions on this topic.

utterance comprehension. Giora argues that the most salient meaning is initially accessed, and only if it does not fit the context, does further processing take place.

Is there a default literal interpretation- familiar vs. novel metaphors?

According to the Graded Salience Hypothesis, in the case of a familiar metaphor, both the 'literal' and the metaphoric meanings are equally salient, which means that both the 'literal' and the metaphoric meanings of such metaphors will be initially accessed in both metaphor and literal biasing contexts. However, Giora argues that less familiar metaphors do involve a sequential 'literal first' process, as novel metaphors have only one salient meaning – the literal one. In such instances, the literal meaning is evoked first and rejected on the basis of poor contextual fit before the less salient metaphoric meaning is activated.

Relevant and irrelevant meanings

The Graded Salience Hypothesis states that in the case of conventional metaphors (in which both the 'literal' and 'non-literal' meanings are initially activated), and in less familiar metaphors (in which the less salient metaphoric meaning is accessed after a delay in which the salient 'literal' meaning is accessed and rejected), the contextually incompatible 'literal' meaning is not discarded in a metaphor biasing context, provided it plays a role in the construction of the compatible meaning, and that it does not 'disrupt' the derivation of the compatible, metaphoric interpretation. In contrast, when processing a familiar metaphor in a literal biasing context, the incompatible, metaphoric meaning (which was initially accessed at the same time as the equally salient 'literal' meaning) would be suppressed, as it interferes with arriving at the compatible 'literal' interpretation.

Natural extension to include hyperbole

As with Glucksberg, Giora does not explicitly discuss hyperbole. However, it is reasonable to speculate that the Graded Salience Hypothesis would account for hyperboles of the type X is Y in the same way as it accounts for metaphors of the same type; not least because the Graded Salience Hypothesis is a general account of language comprehension, not just of metaphor, hence, the premise that salience determines initial processing is applied to all types of utterances.

In the next section, I will discuss a comparison account of metaphor that overcomes many of the limitations of standard comparison accounts (see section 1.4 for full discussion), while still claiming that metaphors are processed as implicit similes.

1.6.4 STRUCTURE MAPPING ACCOUNT OF METAPHOR

Psycholinguist Dedre Gentner and colleagues offer an alternative 'Structure-Mapping' account of metaphor (Clement & Gentner 1991, Forbus, Gentner, & Law 1994; Gentner, Rattermann, & Forbus 1993, Wolff and Gentner 2011). This thesis proposes that metaphor comprehension is a comparison process rather than a categorization process as suggested by concept construction accounts, such as Relevance Theory (Wilson and Carston 2007; Sperber and Wilson 2006) or the class-inclusion account of metaphor (Glucksberg and Keysar 1990). However, the account is such that it doesn't fall foul of the same criticisms leveled at standard comparison accounts (see section 1.4 for discussion).

Gentner and colleagues argue that during comprehension, the hearer engages in a structural alignment process, which involves searching for common relational features (attributes and relations) between the topic and vehicle concepts, followed by an inference projection process in which predicates are mapped/projected from the base (vehicle) to the target (topic). Hearers must keep active relational correspondences between the vehicle and the topic and must not be distracted by surface differences.

Structure alignment

Gentner and colleagues argue that during all comparisons, firstly the two domains (topic and vehicle) are initially 'aligned'[16]; at which stage directionality is not considered (i.e. the role each concept is playing (topic/vehicle) is not considered).

The Structure-Mapping Engine (SME) (Falkenhainer, Forbus, & Gentner, 1989;

[16]'First, the identical predicates in the target and base concepts are matched, and the arguments of these predicates are placed in correspondence by parallel connectivity : midwife - Socrates, mother - student and child - idea. Next, these local matches are coalesced into a global system of matches that is maximally consistent' (Bowdle and Gentner 2005:11)

Forbus, Gentner, & Law, 1995) utilizes "a three-stage local-to-global matching process" (Wolff and Gentner 2011:4) to find the "maximal structurally consistent alignment between two representations".

Stage 1:

All pairs of identical predicates and their corresponding arguments are mapped. (e.g. for the metaphor ''Suburbs are parasites,'' if the topic and vehicle representations include something along the lines of 'parasites get food from host' and 'suburbs get utilities from near by cities', the two 'get-from' predicates would be matched, leading to the further correspondences suburb - parasite, host - city, and food - utilities. Gentner and Colleages argue that this initial 'local matching' stage results in a large number of potential correspondences.

Stage 2:

However, during a second phase, structural consistency is enforced; the local matches are coalesced into small, structurally consistent mapping clusters (called kernels).

Stage 3:

Kernels are merged into large global interpretations, using a merge algorithm (Forbus & Oblinger, 1990) that begins with the maximal kernel, adds the next-largest kernel that is structurally consistent with the first, and continues until no more kernels can be added without compromising structural consistency.

The SME then produces a structural evaluation of the interpretation(s), using a cascade-like algorithm that favors deep interrelated systems over shallow systems, all else being equal.

Predicate projection/mapping

Later in processing, predicates are mapped/projected from base (vehicle) to target (topic). The distinction between metaphoric and literal comparisons lies in the types of predicates that are mapped. In both cases, many relation predicates are mapped from base to target, but in the case of literal comparisons, many more attribute predicates are mapped from base to target (literal comparisons can also generally be

reversed, unlike metaphoric comparisons), than in the case of metaphoric comparisons.

" The hydrogen atom is like our solar system……'The electron revolves around the nucleus, just as the planets revolve around the sun' but not 'the nucleus is yellow, massive etc. like the sun'" (Gentner 1983:3)

No default literal interpretation

The Structure Mapping Engine (SME) can derive two interpretations of a comparison (literal and a metaphorical) in parallel. Therefore, according to this account, metaphoric comparisons of the type 'My lawyer is a shark' are processed in the same way as a literal comparison, which means that there is no need to initiate a special metaphor interpretation process. This also means that as with the concept construction accounts discussed above, this account does not come up against the problem of there being a default 'literal interpretation' which must be arrived at first before being rejected in search of an alternative metaphoric interpretation.

The career of metaphor

In addition to the main working of the account detailed above, Bowdle and Gentner (2005) build the 'Career of metaphor' theory based on the Structure Mapping account, which provides an account of how metaphoric mappings might come to stabilize (be stored in long term memory), and how conventionalized metaphors might be processed. Bowdle and Gentner argue that conventional figurative statements differ from novel ones in that they have 'stored' metaphorical representations, and that where novel metaphors are always processed as comparisons in the way described above, conventional metaphors can either be processed as implicit similes in that way, or they can be processed as categorizations just as literal categorizations (e.g. A lemon is a fruit) would be. As a result of this, they argue that conventionalized metaphors may be quicker to process than novel metaphors as processing is more direct (see chapter 2 for further discussion and empirical evidence).

Hyperbole

Although not discussed by Gentner and colleagues, the Structure-Mapping account appears to entail that hyperbolic comparisons of the type 'The earl grey tea was noxious' or 'His back yard was a forest', would also be processed in the same way as metaphoric ('The politician's speech was noxious' or 'The university was a forest') and literal comparisons ('The varnish was noxious' or 'The national park was a forest'. Structure-mapping offers a way in which metaphorical and literal comparisons can be processed via a single mechanism *"the processing mechanism is indifferent to this distinction"* (Gentner and Wolff 1997:17); the only difference between the two types of comparisons being the type of predicates that are mapped. Therefore, presumably, hyperbole would lie somewhere along the continuum between literal comparisons and metaphors; with hyperbolic comparisons involving more mapping of object attributes than metaphoric comparisons, but less than literal comparisons. See the examples below:

j2) The back yard is a forest (hyperbole)
k2) The university is a forest (metaphor)

It is clear to see that in the case of the metaphor in (k2), relation predicates are mapped, but attribute predicates are not. Universities are big, dense and confusing like a forest (a mapping of relation predicates), but they are not packed full of trees and undergrowth like forests (a mapping of attribute predicates). However, in the case of the hyperbole in (j2), as well as the mapping of relation predicates (e.g. difficult to access and walk through), many attribute predicates will also be mapped. An overgrown, ill-maintained back yard will share many attributes with a forest (e.g. dense foliage; packed full of plants and trees).

Summary

Structural alignment

Gentner and colleagues argue that during comprehension, the hearer engages in a structural alignment process, which involves searching for common relational features (attributes and relations) between the topic and vehicle concepts, followed by an

inference projection process in which predicates are mapped/projected from the base (vehicle) to the target (topic).

Relevant and irrelevant information

Hearers must keep active relational correspondences between the vehicle and the topic, and must not be distracted by surface differences. Thus, relevant relational correspondences will be activated, while irrelevant surface differences will lose activation.

No default literal interpretation

The Structure Mapping Engine (SME) can derive two interpretations of a comparison (literal and a metaphorical) in parallel. Therefore, according to this account, metaphoric comparisons of the type 'My lawyer is a shark' are processed in the same way as a literal comparison, which means that there is no need to initiate a special metaphor interpretation process.

Familiar vs. novel metaphors

Bowdle and Gentner argue that conventional figurative statements differ from novel ones in that they have 'stored' metaphorical representations, and that where novel metaphors are always processed as comparisons in the way described above, conventional metaphors can either be processed as implicit similes in that way, or they can be processed as categorizations just as literal categorizations.

A natural extension to hyperbole

The account posits that metaphorical and literal comparisons can be processed via a single mechanism; the only difference between the two types of comparisons being the type of predicates that are mapped (attribute vs. relation). Therefore, presumably, hyperbole would lie somewhere along the continuum between literal comparisons and metaphors, with hyperbolic comparisons involving more mapping of object attributes than metaphoric comparisons, but less than literal comparisons.

In the next section, I will discuss an account in which it is claimed that our conceptual system is metaphoric in its structure; there are permanent mappings between domains in long-term memory, which facilitate metaphor comprehension during communication.

1.6.5 DIRECT ACCESS VIEW

Raymond Gibbs' Direct Access (DA) model of metaphor holds that it is possible for hearers to comprehend the intended meanings of non-literal utterances, directly, if they are supported by a 'social context' (Gibbs 1994). The hearer need not arrive at a 'literal' interpretation of the entire utterance, before using pragmatic information to infer the intended meaning. As we have seen, this is not a novel claim. All four of the current accounts discussed above, also fall in line with the empirical evidence, by not positing a 'literal-first' processing model. Like lexical pragmatic accounts (Wilson and Carston 2007), the Direct Access account does claim that literalness may still take precedence at a lexical level, yet not at the utterance level. Gibbs (1994: 461) argues that hearers may still 'analyze aspects of what words mean' when comprehending figurative language', so the uniqueness of the account does not lie here.

The Direct Access view stands apart from the other accounts discussed with respect to its claims about the nature of our conceptual representations, and the role they play in metaphor comprehension. Gibbs (1992), following the linguist, Lakoff (1980; 1987; 1990; 1993), argues that metaphors are fundamental to the structure of our network of conceptual representations, rather than instances of ad hoc, occasion specific categorizations for communicative purposes. He argues that we make sense of the world by making metaphoric comparisons, and therefore these comparisons are an integral part of our mental representations, and that new metaphoric comparisons are nearly always built on existing metaphoric mappings between domains in long term memory.

Metaphoric mind

Recall that the class-inclusion account posits that in producing a metaphor, we are constructing an ad hoc category (i.e. VICIOUS TENATIOUS THINGS) with which to categorize the topic (i.e. LAWYERS), and using a 'prototypical' member of that ad hoc category (i.e. SHARKS) to refer to it, as it doesn't have its own associated single lexical item. This entails that every time a novel, yet related metaphor is constructed (e.g. Lawyers are tigers; lawyers are crocodiles etc.), this same process of ad hoc concept construction takes place.

Gibbs (1992) argues that according to Glucksberg's view, many related metaphors would result in many separate conceptual mappings (i.e. LAWYERS – SHARKS; LAWYERS – TIGERS; LAWYERS – CROCODILES), which is an aspect of the account which Gibbs takes issue with. As with the Relevance Theory concept construction account, the class-inclusion account does propose that stable concepts are accessed and used during the construction of ad hoc categories from which metaphors arise, but they do not acknowledge that our stable concepts themselves might be metaphorically structured, and that novel metaphors may be constructed on the basis of such existing, permanent metaphoric conceptual mappings.

Gibbs (1992) follows Lakoff and others (Johnson 1987; Kovecses 1988; Lakoff 1987,1990; Lakoff and Johnson 1980; Lakoff and Turner 1989) by claiming that there are permanent mappings between domains in long term memory, constituted by previous metaphoric comparisons, and that the vast majority of seemingly novel metaphors reflect stable metaphoric conceptual mappings (i.e. if an individual already has a mapping between LAWYERS and SHARKS, then that individual has an understanding of the relationship between lawyers and vicious, tenacious things, and could construct a novel, yet related metaphor 'My lawyer is a tiger', with 'tiger' being an alternative prototypical member of that ad hoc category VICIOUS TENACIOUS THINGS). On this basis, Gibbs (1992) argues that we understand the world, or at least structure our more abstract concepts, in terms of our other concepts (e.g. we understand love in terms of a journey), and that this influences the vast majority of metaphor comprehension.

Gibbs does not posit a processing model of exactly what he believes to be *"the conditions under which people ordinarily activate conceptual metaphors during metaphor comprehension*" (Gibbs 1992:576). On the contrary, he argues that more fine-grained empirical studies would need to be carried out in order to make such predictions. He proposes two hypotheses:

"either….people comprehend metaphoric statements by instantiating conceptual metaphors from long-term memory at the same time that they engage in ad hoc categorization…..or perhaps people use pre-existing metaphorical mapping when they reflect on the meanings of verbal metaphors, but do not access this metaphorical knowledge in long-term memory during the immediate, on-line processing of linguistics metaphors." (Gibbs 1992:576).

Familiarity

By definition, the Direct Access account is an account of both highly conventionalized metaphors (e.g. She is an angel or she is a pig) (conceptual mappings between domains (ANGEL – KIND; GREEDY – PIG), and novel metaphors (love is a mountain path) based on pre-existing conceptual mappings (LOVE – JOURNEY) in long term memory.

Gibbs (1992) alludes to the fact that he would accept an ad hoc concept construction account of the few cases that he concedes may be truly novel metaphors, but that Glucksberg and Keysar (1990) are wrong not to acknowledge that most metaphors are based on pre-existing metaphoric conceptual mappings.

Gibbs argues that this notion of metaphoric mappings in our conceptual system, explains why some, seemingly novel metaphors appear so easy to comprehend, where others do not. The former could be based on a pre-existing metaphoric mapping between domains in long-term memory, and the latter could not be.

Hyperbole

Gibbs (1990; 1992; 2000; 2002; 2006) applies the Direct Access view to metaphor, idioms and irony. However, presumably the claim that hearers need not arrive at a

literal interpretation of an utterance before inferring a figurative interpretation would apply to all instances of 'non-literal' language which rely on mappings between domains i.e. hyperbolic statements pertain to mappings between domains just as metaphoric statements do. Thus, the interpretation of hyperbolic statements should be facilitated by the pre-existing mappings posited by Gibbs, just as he proposes metaphor interpretation to be, as if novel metaphoric comparisons are nearly always built on existing metaphoric mappings between domains in long-term memory, then, probably, so are novel hyperbolic comparisons. Consider the examples in (l2) and (m2),

l2) The bath is boiling
m2) The sea is boiling[17]

The statement in (l2) would be categorized as a hyperbole (a broadening of the concept BOILING along the temperature scale to include very hot water as well as water at 100 degrees centigrade), and the statement in (m2) would be categorized as a metaphor (a broadening of the concept BOILING to include any rough and turbulent waters, including a stormy sea), but both pertain to distinct mappings between the topic and vehicle domains. Thus, it would be reasonable to conclude that the existence of stable metaphoric mappings in long-term memory would facilitate hyperbole comprehension just as Gibbs argues they would facilitate metaphor comprehension.

Summary

A metaphorical mind

Gibbs (1992) argues that metaphors are fundamental to the structure of our network of conceptual representations, rather than instances of ad hoc, occasion specific categorizations for communicative purposes. He argues that we make sense of the world by making metaphoric comparisons, and therefore these comparisons are an integral part of our mental representations. Consequently, new metaphoric

[17] Taken from Carston 2010

comparisons are nearly always built on existing metaphoric mappings between domains in long-term memory.

No default literal interpretation

By definition, this account entails that metaphoric interpretations are accessed directly, and a hearer need not go via the literal interpretation of the utterance.

Familiar vs. novel metaphors

The Direct Access account is an account of both highly conventionalized metaphors (e.g. She is an angel or she is a pig) (conceptual mappings between domains (ANGEL – KIND; GREEDY – PIG), and novel metaphors (love is a mountain path) based on pre-existing conceptual mappings (LOVE – JOURNEY) in long-term memory. Gibbs does, however, concede that the only exception might be truly novel metaphors, which are not based at all on any pre-existing conceptual mapping. He argues that these may indeed be interpreted via something like the concept construction account posited by Glucksberg and colleagues.

A natural extension to hyperbole

Like metaphoric statements, hyperbolic statements pertain to mappings between domains. Thus, the existence of stable metaphoric mappings in long-term memory would facilitate comprehension of hyperboles just as Gibbs claims they facilitate the comprehension of metaphor, as if novel metaphoric comparisons are nearly always built on existing metaphoric mappings between domains in long-term memory, then surely so are novel hyperbolic comparisons.

Before discussing the processing predictions made by the current theoretical accounts discussed in this chapter, I will summarize and contrast the theories according to the claims they make with respect to 5 key issues relating to figurative language comprehension, all of which will be relevant to the findings (both existing and new) and discussion presented in the rest of this thesis.

1.6.6 SUMMARY OF CURRENT ACCOUNTS OF METAPHOR

What is the metaphor interpretation comprehension procedure?

The concept construction accounts (Relevance Theory and the Class-inclusion account) propose that metaphors serve to categorize topics within an ad hoc, occasion specific category, which is derived from the vehicle term, thus allowing features of that ad hoc category to be projected from the vehicle to the topic. However, the two concept construction accounts discussed differ with respect to the claims they make about what drives interpretation.

Relevance Theorists lay out a detailed comprehension procedure, which, is argued to guide the hearer in her selection of relevant features with which to construct our 'ad hoc concept'. On the other hand, Glucksberg and colleagues claim that it is the topic's dimensions of attribution, as well as the prototypical features of the metaphor vehicle, which guide our construction of the ad hoc category of which the metaphor vehicle is an exemplar.

Likewise, where Relevance Theorists claim that expectations of relevance trigger the concept construction process, Glucksberg and colleagues propose that it is the recognition of the dual-reference of the vehicle, which signals metaphoricity, and thus triggers the hearer to construct the ad hoc concept of which they believe the vehicle to be an exemplar, which in turn determines the properties which are intended for attribution.

In contrast with the two concept construction/categorization accounts, the structure mapping account states that novel metaphor comprehension involves the neutral structural alignment of the topic and vehicle concepts, and the subsequent projection of relevant predicates from the vehicle to the topic.

Although she doesn't place her stake in the categorization/comparison debate, Giora proposes that it is salience rather than literality/non-literality, or contextual relevance, that determines the initial processes involved in metaphor comprehension (or any

utterance comprehension). She argues that the most salient meaning is initially accessed, and only if it does not fit the context, does further processing take place.

Finally, the Direct access account does not posit a processing model, but instead, makes the more general claim that metaphoricity is at the heart of our conceptual representations of the world, and thus such pre-existing conceptual mappings are utilized during the processing of seemingly novel metaphors.

What is the fate of relevant and irrelevant information/meanings associated with encoded concepts during metaphor comprehension?

According to both concept construction accounts (Relevance Theory and Class-inclusion), in a metaphor biasing context, metaphor relevant features associated with the lexically encoded vehicle concept will be activated, while those features that are irrelevant will not be considered during interpretation, and will therefore lose activation.

Likewise, according to the Structure-mapping model, hearers must keep active relational correspondences between the vehicle and the topic, and must not be distracted by surface differences. Thus, relevant relational correspondences will be activated, while irrelevant surface differences will lose activation.

The Graded Salience Hypothesis, on the other hand, makes quite different claims with respect to the treatment of relevant and irrelevant meanings during processing. Giora claims that in the case of conventional metaphors and less familiar metaphors, the contextually incompatible 'literal' meaning is not discarded in a metaphor biasing context, provided it plays a role in the construction of the compatible meaning, and that it does not 'disrupt' the derivation of the compatible, metaphoric interpretation. In contrast, when processing a familiar metaphor in a literal biasing context, the incompatible, metaphoric meaning would be suppressed, as it interferes with arriving at the compatible 'literal' interpretation.

Must a default literal interpretation arrived at before a more appropriate non-literal interpretation can be derived?

All of the above accounts, with the exception of Giora's Graded Salience Hypothesis account of novel metaphor comprehension, propose that we are not required to go via the literal interpretation of a figurative statement in order to arrive at an appropriate metaphoric interpretation as was suggested by neo-Gricean accounts (Clark and Lucy 1965; Janus and Bever 1985; Lyons 1977). Giora, on the other hand claims that the only salient meaning available when processing a novel metaphor, will be the 'literal' meaning, and thus, any subsequent interpretation derived from the context would be arrived at after first processing the 'literal' meaning.

Are the processes and mechanisms posited different for familiar and novel metaphors?

Wilson and Carston (2007) argue that frequent use of a metaphoric statement can lead to a metaphor vehicle gaining an additional lexically encoded meaning. They argue that once a metaphor vehicle has become polysemous in this way, it is likely to be processed as an ambiguous word, thus requiring disambiguation, rather than ad hoc concept construction.

Likewise, Glucksberg (2001) states that his account is one of novel metaphor comprehension, but he argues that as a result of frequent use, metaphor vehicles can transition from being good exemplars of an ad hoc category, to become prototypical members of that category. In such instances, they may come to lexically encode the 'ad hoc category', meaning that processing will involve concept selection as opposed to the concept construction process posited for novel metaphor interpretation.

An account centered around salience would always have to posit quite different accounts of familiar and unfamiliar metaphor processing, as by definition an intended metaphoric interpretation of an unfamiliar metaphor would not be salient. Thus, the Graded Salience Hypothesis claims that in the case of a familiar metaphor both the 'literal' and the metaphoric meanings will be initially accessed in both metaphor and literal biasing contexts, as both the 'literal' and the metaphoric meanings are equally salient. However, in the case of less familiar metaphors, the literal meaning is evoked

first and rejected on the basis of poor contextual fit before the less salient metaphoric meaning is activated, as novel metaphors have only one salient meaning – the literal one.

Bowdle and Gentner (2005) argue that conventional figurative statements differ from novel ones in that they have 'stored' metaphorical representations, and that where novel metaphors are always processed as comparisons in the way described above, conventional metaphors can either be processed as implicit similes in that way, or they can be processed as categorizations just as literal categorizations.

Finally, the Direct Access account does not distinguish between highly conventionalized metaphors and novel metaphors (love is a mountain path) based on pre-existing conceptual mappings (LOVE – JOURNEY) in long term memory. Gibbs does, however, concede that truly novel metaphors, which are not based at all on any pre-existing conceptual mapping might be processed via occasion specific concept construction.

Can the theories discussed also account for how hyperbolic statements are processed?

The relevance theoretic lexical pragmatic account claims that approximations, hyperboles and metaphors are all instances in which an accurate interpretation is arrived at by constructing an occasion specific concept that has a broader denotation than that of the lexically encoded vehicle concept, and that all such instances of lexical broadening can be accounted for by their on-line concept construction account. This raises the question, why do many theories claim only to account for metaphor? Are they right to apply their accounts to metaphor alone, or could any of the current accounts discussed be extended to account for hyperbole; the other trope which is the focus of this thesis?

The class-inclusion account, though posited as an account of metaphor alone, is also equipped to account for hyperbolic statements. In fact, I propose that the workings of the account entail that hyperbolic statements must be accounted for by the same comprehension procedure, as there is nothing in the detail of the processing model

which would be able to differentiate between a hyperbolic and a metaphoric statement.

As with Glucksberg, Giora does not explicitly discuss hyperbole. However, it is reasonable to speculate that the Graded Salience Hypothesis would account for hyperboles of the type X is Y in the same way as it accounts for metaphors of the same type; the Graded Salience Hypothesis is a general account of language comprehension, which means that the premise that salience determines initial processing is applied to all types of utterances.

The Structure-Mapping account posits that metaphorical and literal comparisons can be processed via a single mechanism; the only difference between the two types of comparisons being the type of predicates that are mapped (attribute vs. relation). Therefore, I argue that, presumably, hyperbole would lie somewhere along the continuum between literal comparisons and metaphors, with hyperbolic comparisons involving more mapping of object attributes than metaphoric comparisons, but less than literal comparisons.

Finally, hyperbolic statements pertain to mappings between domains, just as metaphoric statements do. Thus, the existence of stable metaphoric mappings in long-term memory would facilitate comprehension of hyperboles just as Gibbs claims they facilitate the comprehension of metaphor, as if novel metaphoric comparisons are nearly always built on existing metaphoric mappings between domains in long-term memory, then surely so are novel hyperbolic comparisons.

In table 1, each of the accounts are contrasted with respect to the five issues discussed above.

Table 1. Current theoretical accounts compared

	Category assertion or implicit simile?	**Is there a default literal interpretation?**	**Are familiar and novel metaphors processed differently?**	**Can the account be extended to hyperboles?**
Neo-Gricean Comparison accounts	*Implicit similes*	*Yes*	*Presumably no.*	*Yes*
Relevance Theoretic account	*Category assertions*	*No*	*Yes*	*Yes*
Class-inclusion account	*Category assertions*	*No*	*Yes*	*Yes*
Graded Salience Hypothesis		*No*	*Yes*	*Yes*
Structure-Mapping account	*Implicit similes*	*No*	*Yes*	*Yes*
Direct Access account		*No*	*Yes. Only completely novel metaphors are not processed via existing domain mappings*	*Yes*

1.7 ADULT PROCESSING PREDICTIONS OF THE ABOVE ACCOUNTS

1.7.1 METAPHOR

The current accounts discussed make a number of processing predictions, many of which have been empirically tested over the last few decades. Before discussing the existing data in chapter 2, I will discuss in some detail, the predictions made by each of the accounts.

General predictions

Does metaphor processing involve sequential stages, starting with arrival at a literal interpretation (as suggested by neo-Gricean accounts)?

Non-sequential

The class-inclusion account, the Relevance Theoretic account, and the Direct Access

account, all propose that the literal interpretation only has priority over the figurative one at the local, lexical level, not at the global level of the utterance.

The Relevance Theoretic account states that the lexically encoded vehicle concept is 'accessed' during the search for relevant features with which to construct the occasion specific communicated concept, but a literal interpretation of the entire utterance is not arrived at by default before an alternative, more appropriate interpretation can be derived. Relevance theorists posit that 'mutual adjustment of the explicit content and contextual implications takes place in parallel rather than in sequence' (Sperber and Wilson 2006:14).

The class-inclusion account holds that it is both the linguistic and the discourse context which guides the hearer as to whether a vehicle term such as 'shark' is being used to refer to the basic-level category or the superordinate category; the literal meaning of the utterance is not derived first, before it is assumed that the vehicle term is being used to refer to the superordinate category.

Finally, Gibbs' Direct Access view holds that while hearers may access concepts in order to analyze aspects of word meaning, hearers need not derive a literal meaning of the sentence as a whole before arriving at the intended figurative meaning; they can access the figurative interpretation directly via pre-existing mappings between domains in long-term memory.

The structure-Mapping account also avoids a sequential processing account. The Structure Mapping Engine can derive two interpretations of a comparison (literal and figurative) in parallel. Therefore, according to this account, figurative comparisons of the type 'My lawyer is a shark' are processed in the same way as a literal comparison, and there is no special metaphor interpretation process, which needs to be triggered.

Processing predictions

On this basis, all of the accounts discussed above, unlike neo-Gricean accounts (which posit a sequential processing account), predict that, all other things being equal, metaphors should take no longer to process than comparable literal statements. Moreover, there should be no delay in the availability of a metaphoric interpretation.

Both sequential and non-sequential – salience dependent

Giora's Graded Salience Hypothesis account of familiar metaphors is in line with the other accounts discussed above, as she also claims that such metaphors do not undergo a 'literal first', sequential comprehension procedure. However, her account of novel metaphor interpretation differs. Giora argues that the literal meaning of a novel metaphor is accessed first, and rejected on the basis of poor contextual fit, before an accurate non-literal interpretation can be arrived at, because there is only one salient meaning in such instances; the literal meaning.

Processing prediction

On this basis, according to the Graded Salience Hypothesis, we would expect novel metaphor comprehension to be more effortful, and consequently, more time-consuming than comparable literal statements, and familiar metaphors. (See discussion below for all the discussed accounts' predictions with respect to the novel vs. familiar distinction).

Are metaphoric interpretations 'richer' and thus, harder to process?

The Relevance Theoretic account (Wilson and Carston 2007; Carston and Wearing 2011) predicts that the more implicatures an interpretation generates (the number of cognitive effects it yields), the heavier the dependence on memory will be. This is because the context (previous conversation and surrounding linguistic material) must be recalled in order for the implicatures to be integrated into the discourse (backwards and forwards inferences are required). Therefore, the account predicts that the more implicatures there are, the longer the interpretation process will take.

However, the output of the lexical adjustment procedure Relevance Theorists posit for the processing of non-literal utterances contributes to the propositional content of the utterance, not the implicit content. This means that according to this account, non-literal utterances do not necessarily yield any more implicatures than a comparable literal utterance. Having said that, the lexical adjustment procedure is highly likely to also result in implicatures being derived, especially if the figurative statement is embedded within a rich context. Thus, although metaphoric interpretations do not necessarily generate any more implicatures than literal interpretations, it is likely that they frequently do.

Processing prediction

On this basis at least, metaphors may take longer to process than literal statements. Any such processing time differences could either be attributed to the processes involved in arriving at the explicit content of the utterance, or the richness of the interpretation arrived at (number of implicatures). As the Relevance Theoretic comprehension procedure is not sequential, but that of mutual adjustment, it is not the case that we derive the metaphoric meaning first (as part of the explicature), and then go on to derive various rich implicatures. As these processes are said to be simultaneous and feed in to one another, there is no way to set them apart temporally in an experimental setting.

Notions of implicit and explicit content, cognitive effects and richness of an interpretation are associated with pragmatics accounts, and thus the other accounts discussed here do not make any predictions in relation to this issue.

What happens to relevant and irrelevant information during processing?

The Relevance Theoretic account, the class-inclusion account, and the Structure mapping account, all entail that the activation level of the concept associated with the metaphor vehicle will be reduced during novel metaphor comprehension (either due to active suppression or passive decay. See section 2.1.4 for full discussion).

Glucksberg's class inclusion account states that an occasion specific concept is constructed based on metaphor relevant features of the superordinate concept denoted by the vehicle term, and metaphor inconsistent features become deactivated due to lack of attention, or active suppression (see section 2.1.4 for full discussion of the mechanism of suppression).

The Relevance Theoretic lexical pragmatic account states that an ad hoc, occasion specific concept is constructed on the basis of the metaphor relevant properties of the lexically encoded vehicle concept, and metaphor irrelevant feature(s) are 'dropped' or 'demoted' (Carston 2007:334-358). The authors leave open for interpretation what the process of 'dropping' or 'demotion' would involve in lexical processing terms (passive decay as a result of lack of attention, or active suppression). However, a number of recent studies suggest that the process they describe would result from active suppression (Gernsbacher. M.A, Keysar. B, Robertson. R, and Werner. N.

1995, 1997, 2001, McGlone & Manfredi, 2001, and Rubio-Fernandez 2004, 2007). See section 2.1.4 for full discussion.

Gentner and colleague's Structure-Mapping account states that metaphor interpretation is a comparison process in which hearers must keep active relational correspondences between the vehicle and the topic and must not be distracted by surface differences, thus, less attention must be paid to these surface differences, or they may even need to be actively suppressed.

Contrary to the above accounts, Giora's Graded Salience Hypothesis states that the contextually incompatible 'literal' meaning is not discarded at all in a metaphor biasing context, provided it plays a role in the construction of the compatible meaning, and that it does not 'disrupt' the derivation of the compatible, metaphoric interpretation. She argues that it is when processing a familiar metaphor in a 'literal' biasing context, that inhibition might take place. Furthermore, she maintains that the contextually incompatible, yet equally salient metaphoric meaning would require suppression in such instances.

Since Gibbs does not present a processing model of metaphors, but instead makes a more general claim about the metaphorical nature of our conceptual representations, and the role that stable conceptual mappings might play during metaphor comprehension, the DA account does not make clear predictions with respect to activation and suppression.

Activation pattern predictions

According to the current accounts that make predictions in this respect, we might expect the following patterns of activation:

1. Familiar metaphors in a metaphor-biasing context:

Graded Salience Hypothesis - Literal and metaphoric meanings will be initially activated, and will remain equally activated.

Relevance Theory, Class-inclusion, and Structure-Mapping - Although the literal and metaphoric meanings will be initially activated, the literal meaning will show signs of suppression after initial processing.

2. Familiar metaphors in a literal-biasing context:

Graded Salience Hypothesis - Literal and metaphoric meanings will be initially activated, and will remain equally activated.

Relevance Theory, Class-inclusion, and Structure-Mapping - Although both the literal and metaphoric meanings will both be initially activated, the metaphoric meaning will show signs of suppression after initial processing.

Novel metaphors in a metaphor-biasing context:

Graded Salience Hypothesis – Only the literal meaning will initially be activated, and after some delay, both the literal meaning and the metaphoric meaning will show signs of activation.

Relevance Theory, Class-inclusion, and Structure-Mapping - Although both the literal and metaphoric meanings will both be initially activated, the literal meaning will show signs of suppression – or at least reduction - after initial processing.

Novel metaphors in a literal-biasing context:

Graded Salience Hypothesis – Only the literal meaning will be activated.

Relevance Theory, Class-inclusion, and Structure-Mapping - Only the literal meaning will be activated. Presumably, according to all accounts, a novel metaphorical expression is understood literally in such a literal biasing context.

Are there processing differences between novel and familiar metaphors?

Empirical research suggests that familiarity (as well as aptness) affects metaphor comprehension (Blasko Blank, 1988; Blasko & Connine, 1993; Camac & Glucksberg, 1984; Gildea & Glucksberg, 1983; Glucksberg, Gildea, & Bookin, 1982; Martin, 1992). In line with these findings, all the accounts discussed in this section predict that familiar and/or conventionalised metaphors may be easier to process than unfamiliar metaphors (Bowdle and Gentner 2005; Glucksberg 2001, 2003; Gibbs 1992).

Relevance-theorists explicitly state that their account is intended as a model of novel figurative language comprehension. Conventionalised figurative statements (e.g. She

is an Angel) most likely undergo a faster, less attentional process of disambiguation (Swinney 1979), as such conventionalised metaphor vehicles have most likely become polysemous through frequent use in a metaphoric context (Wilson and Carston 2007:26).

Furthermore, Glucksberg (2001:112) states '...metaphors become conventional [when they] ideally represent their attributive categories' i.e. they become prototypical of the 'originally' ad hoc category referred to in frequently used metaphors, and thus may go on to lexically encode the 'ad hoc category'. In such instances, the hearer would be able to retrieve the intended meaning from long-term memory.

Giora posits processing distinctions between novel and familiar metaphors, since she states that in the case of familiar metaphors (not just highly conventional metaphors, but also in any way familiar ones), both salient literal and metaphoric meanings are available from the beginning of processing, however there is only one salient meaning available during the initial processing of a novel metaphor; the metaphoric meaning must be subsequently arrived at.

Finally, not only does the Direct Access account entail that familiar metaphors (e.g. My sister is an Angel) and novel metaphors based on an existing metaphorical mapping (e.g. My day has been a tsunami) will be quicker to process than completely novel metaphors (e.g. My family is a mirror) because there are relevant, stable conceptual mappings already in place in long-term memory. Thus, this account predicts that a novel metaphor (e.g. the road is a worm) which is based on the same conceptual mapping as a conventional metaphor (e.g. the road is a snake), would be quicker to process than a novel metaphor which does not pertain to any stable conceptual mapping (e.g. my husband is a curtain).

The above accounts do differ with respect to how familiar or novel a metaphor needs to be to warrant a different comprehension procedure. Relevance theorists (Wilson and Carton 2007), Gentner and colleagues, and Glucksberg and colleagues (Glucksberg and Keysar 1990; Glucksberg 2001), for example, only posit a distinct processing model for the most highly conventionalized metaphors, which, they argue, will have acquired an additional sense through such frequent use. Whereas, as any

account based on salience would have to predict, the Graded Salience Hypothesis entails that any metaphor that is at all familiar will be quicker to process than one which is not, because both a literal and a metaphoric interpretation will be available right from the beginning of processing in the case of the familiar metaphor. However, in the case of the completely novel metaphor, only a literal interpretation will be available at first.

What other processing predictions do the specific theories make?

Concept construction accounts

These accounts predict a main effect of aptness (Glucksberg & McGlone 1999); as aptness decreases (i.e. the metaphor vehicle is not a good enough exemplar of the relevant category), the likelihood of comprehending the statement metaphorically decreases, and therefore the likelihood of successful categorization also decreases. Moreover, even if a non-apt metaphor is eventually understood, it would presumably take longer to process than an apt metaphor. Thus, preference for the metaphor (categorical) form should be greater for highly apt statements than for less apt statements.

In addition, if metaphors are processed in category assertion form as the concept construction accounts claim then they should, in general, be non-reversible (i.e. not retain the same meaning when reversed).

Class-inclusion account specific predictions

This account, perhaps counter-intuitively, entails an early alignment process just as the Structure Mapping account does *"A first step is alignment of the vehicle and the topic concepts so that dimensions of attribution of the topic can be matched against candidate properties of the vehicle" (Glucksberg 2001.p. 54)*. Therefore, any evidence suggesting the existence of an early alignment process would not be evidence against this account (e.g. Wolff and Gentner's (2011) findings. See section 2.1.3 for full discussion of such evidence).

However, according to this account, the early alignment process would not be role neutral as the Class-inclusion account's claim is that the topic and vehicle concepts

input different things to the alignment/comparison process (i.e. that which is aligned/compared is different for topics and vehicles). Therefore, the input to the alignment process would be different for the metaphor 'the surgeon was a butcher' than it would be for the metaphor 'the butcher was a surgeon'. In the first instance, dimensions of attribution of the concept SURGEON would be aligned with properties of the concept BUTCHER. Whereas in the second instance, dimensions of attribution of the concept BUTCHER would be aligned with properties of the concept SURGEON (i.e. the alignment process would be role specific). Therefore, any evidence of role neutrality during the very initial stages of processing would go against the class-inclusion account.

Structure-mapping account specific predictions

According to the Structure-Mapping account, conventional metaphors can be processed categorically. Therefore, since metaphors have a categorical structure (X is a Y), people should prefer to see conventional metaphors in metaphor form rather than in simile form. On the other hand, Gentner and colleagues claim that novel metaphoric statements are processed as comparisons, and thus, despite the fact that metaphors have a categorical structure, it follows that novel statements should be preferred in simile form, since they are processed as such anyway. Processing effort would be reduced if the statement does not have to be converted from categorical form to simile form in order to be interpreted.

Although this account does entail that overall, topics and vehicles have specific roles during metaphor comprehension (inferences are projected from the vehicle to the topic), topic and vehicle role sensitivity arises late in processing. The authors argue that there is an initial symmetrical alignment process of the topic and vehicle concepts which is 'role neutral'. The presentation of any metaphor, whatever its kind, should immediately trigger the property matching process, and thus metaphor comprehension should be facilitated (primed) by immediate prior exposure to the same metaphor.

Moreover, this account predicts that the proposed early symmetrical alignment process should be easier (quicker) when the topic and vehicle are similar with respect to the properties/predicates that the metaphor pertains to i.e. alignment should be easier for when topics and vehicles are similar. Thus, what Wolff and Gentner (2000) refer to as high-similarity metaphors such as 'That soldier is a pawn' should be faster

to process than low-similarity metaphors such as 'That senator is a pawn.' *"This is because the abstraction associated with a pawn-'being controlled from above' is also present to some degree in representations of soldier, resulting in a rather large match."* Wolff and Gentner 2000:5)

In addition, this account predicts that metaphor processing should be facilitated when the two terms being compared are close in the text (as in predicative metaphors over referential metaphors) as this triggers the predicate alignment process to begin.

Finally, Gentner and colleagues claim that metaphoric mappings can be 'incrementally extended' in order to process extended metaphors (Gentner and Bowdle 2008), and that this facilitates interpretation. The authors thus predict that novel metaphors will be quicker to process if they are an extension of a preceding metaphor.

On the other hand, according to the 'career of metaphor' hypothesis, a conventional metaphor may be processed as a categorization, and thus should not benefit from pre-existing domain mappings created during the processing of a preceding metaphor of which it is an extension.

Direct Access account predictions

This account makes the general prediction that metaphor processing will be facilitated by a preceding metaphor if that metaphor is based on the same domain mapping (i.e. 'This relationship is a long and bumpy road' would be facilitated by a preceding metaphor 'it is a dangerous path to take').

Graded Salience Hypothesis predictions

According to this account, during the processing of familiar metaphors, both salient metaphoric and literal meanings are activated in both metaphor and literal biasing contexts (as discussed above, only in a literal biasing context would suppression take place – the contextually inappropriate metaphoric meaning would be suppressed). However, during the early stages of processing a novel metaphor, only a literal

meaning is activated; an appropriate metaphoric interpretation is derived and therefore, will become active later during processing.

The table below illustrates the comparable processing predictions each of the accounts make with respect to metaphor interpretation.

Table 2. Metaphor processing predictions

	Is a literal interpretation processed first?		**Does metaphor irrelevant information associated with the 'literal' meaning lose activation?**		**Are there processing differences between familiar and novel metaphors?**
	Familiar but not conventionalised metaphors	*Novel Metaphors*	*Familiar but not conventionalised metaphors*	*Novel metaphors*	
Neo-Gricean comparison accounts	*Yes*	*Yes*			
Relevance Theoretic account	*No*	*No*	*Yes*	*Yes*	*Yes, but only highly conventionalized metaphors are processed differently (disambiguation)*
Class-inclusion account	*No*	*No*	*Yes*	*Yes*	*Yes, but only highly conventionalized metaphors are processed differently (disambiguation)*
The Structure-Mapping account	*No*	*No*	*Yes*	*Yes*	*Yes*
The Graded Salience Hypothesis	*No*	*Yes*	*No*	*No*	*Yes*
The Direct Access account	*No*	*No*			*Yes, but only completely novel metaphors are processed differently (potentially ad hoc concept construction)*

	Does processing begin with an alignment of the topic and vehicle concepts?	**Do topics and vehicles play different roles during early processing? Or does processing begin with a role neutral mapping process?**	**Will novel metaphor processing be facilitated by a preceding related metaphor?**	**Will both a literal and a metaphoric interpretation be initially activated when processing a metaphorically intended utterance?**	
				Familiar but not conventionalised metaphors	*Novel Metaphors*
Neo-Gricean comparison accounts				*No, just a literal*	*No, just a literal*
Relevance Theoretic account	*No*	*Topics and vehicles play different roles during early processing*	*Yes*	*No, just the most relevant*	*No, just the most relevant*
Class-inclusion account	*Yes*	*Topics and vehicles play different roles during early processing*	*Yes*	*No, just a metaphoric*	*No, just a metaphoric*
The Structure-Mapping account	*Yes*	*Early processing is role neutral with respect to the topic and vehicle*	*Yes*	*The SME can derive literal and metaphoric interpretations in parallel*	*The SME can derive literal and metaphoric interpretations in parallel*
The Graded Salience Hypothesis			*Yes*	*Yes*	*No, just a literal*
The Direct Access account			*Yes*		

1.7.2 HYPERBOLE

Perhaps, with the exception of Carston and Wearing's (2011) discontinuity account, the accounts discussed above either explicitly propose, or suggest that the same comprehension procedures underlie metaphor and hyperbole. Therefore, the above predictions in relation to sequential vs. non-sequential processing, richness of the interpretation, deactivation of context irrelevant features, and effects of familiarity, as well as the theory specific predictions, would also apply to the processing of hyperbolic statements.

As discussed, Relevance Theorists (Sperber and Wilson 2006; Wilson and Carston 2007), draw no distinction between the comprehension procedures involved in the derivation of metaphoric and hyperbolic interpretations. They place the two interpretive outcomes on a broadening continuum in which features of the lexically encoded concept are dropped during the construction of the metaphoric interpretation. Therefore, other things being equal (i.e. number of implicatures)[18], this account does not predict any processing differences between metaphor and hyperbole.

Carston and Wearing (2011; Carston 2010) however, have put forward an adapted, discontinuous version of the Relevance Theoretic ad hoc concept construction account. Though Carston and Wearing are committed to the unification of loose use, hyperbole, metaphor and narrowing under one process of lexical adjustment, they are not content with the notion that metaphoric interpretations are simply a further broadening of the encoded meaning than approximate and hyperbolic interpretations. Instead they propose that metaphor interpretation necessarily involves a narrowing as well as a broadening of the lexically encoded vehicle concept. Narrowing and broadening are not, however, psychologically distinct pragmatic processes. Each would not come with its own default 'cost' in processing time. Therefore, the processing predictions of Carston and Wearing's (2011) discontinuity account would not differ from the Relevance theoretic unified lexical pragmatic account, on this basis at least.

[18] This is unlikely to be the case, as metaphors are often richer and yield more such implicatures.

Gentner and colleagues (Clement and Gentner 1991; Gentner 1983; Wolff and Gentner 2000; 2011) only discuss metaphoric and literal comparisons, but they claim that all comparisons are processed in the same way; during the processing of all comparisons (of which they believe novel metaphors of the form X is Y to be processed as) the Structure Mapping Engine searches for common relational features between the vehicle and the topic concepts. Thus, according to this account novel hyperboles of the form X is Y must, ipso facto, be processed in the same way. Therefore, like the original RT concept construction account, all other things being equal, this account would not predict processing differences between metaphor and hyperbole.

Although Glucksberg and colleagues (1990; 2001) do not discuss hyperbole within the class-inclusion account, it would be a limitation of the account if it were not extendable to closely related tropes such as hyperbole. This account claims to deal with metaphorical category assertions of the form X is Y (e.g. the university is a forest). Just like metaphors, hyperboles frequently take this form (e.g. the back yard was a forest), and in both cases the vehicle is not referring to its lexically encoded category. Thus, it would be reasonable to conclude that the class inclusion account would not discriminate between the two tropes and, all other things being equal, would not predict processing differences between the two tropes.

Like Gentner and Glucksberg and colleagues, Giora (1997; 1999; 2002) does not explicitly discuss hyperbole, however the GSH is a general account of language comprehension, not just of metaphor, hence, the premise that salience determines initial processing is applied to all types of utterances. Therefore, this account predicts that in the case of familiar hyperboles, both salient 'literal' and 'hyperbolic' interpretations will be activated and there will be no signs of subsequent suppression taking place. However, in the case of unfamiliar hyperboles, only one salient 'literal' meaning is activated, necessitating further processing triggered by the rejection of this salient meaning based on lack of contextual fit. Thus, again, all other things being equal, this account does not predict processing differences between the two tropes.

Gibbs (1990; 1992; 2000; 2002; 2006) also focuses his application of the Direct Access view on metaphor, as well as idioms and irony. However, the claim that the hearer need not arrive at a literal interpretation at utterance level, before inferring a

figurative interpretation, must apply to all 'non-literal' language. Similarly, it is reasonable to presume that any effect on metaphor comprehension that the presence of permanent metaphoric conceptual mappings in long term memory might have, would surely have a comparable effect on the comprehension of hyperbolic statements. Thus, it is reasonable to assume that this account would predict that hyperbole processing will be facilitated by a preceding hyperbole if that hyperbole is based on the same domain mapping, just as metaphor processing is.

The fact that all but perhaps Carston and Wearing's (2011) account propose, entail, or suggest identical comprehension procedures and processing mechanisms for metaphor and hyperbole, provides strong motivation to investigate and contrast the processes and mechanisms underlying both tropes. Chapter 3 will be dedicated to presenting the findings from a series of studies in which we do just that. Evidence of similar comprehension processes underlying both tropes would serve to support the claims made by those accounts discussed above, and endorse the arguments made by Relevance Theorists for a 'deflationary account of metaphor'.

1.8 SUMMARY

In this chapter, I have attempted to present the details of those theories of figurative language that raise interesting questions with respect to the cognitive processes and mechanisms that might be responsible for the interpretation of non-literal language. What processes and mechanisms are involved in arriving at metaphoric and hyperbolic interpretations? What factors affect our ability to derive such figurative interpretations, and the speed at which we can derive them? Are metaphoric interpretations just a further broadening of the encoded meaning than hyperbolic interpretations, or is there something unique about metaphor, due to the comprehension processes involved and/or the interpretation arrived at?

The current theories suggest that metaphoric interpretations are available from the beginning of processing and that metaphoric interpretations should not necessarily take any longer to process than literal interpretations, as there is no default literal meaning that must be arrived at before an alternative, more appropriate interpretation can be derived. Many of the current theories also suggest that metaphor irrelevant

information is discarded/dropped during processing. This raises the question 'how might that discarding take place?' Do we allow such irrelevant information to decay through lack of attention, or must it be actively suppressed so as to avoid interference? If so, what cognitive mechanisms would be recruited for the task of suppression?

Finally, the Relevance Theoretic lexical pragmatic account strips metaphor of its sense of uniqueness, by positing a unified lexical pragmatic processing model which they claim can account for the interpretation of all less than literal utterances, including hyperbole and approximation. In fact, under closer inspection there is no reason why any of the current metaphor theories discussed could not be extended to account for hyperbole interpretation as well as metaphor interpretation. This presents us with an interesting research question – will we find evidence to suggest that metaphors and hyperboles are processed in the same way as the theories suggest, or might we find evidence of processing differences?

In chapter 2, I will discuss the findings from various studies that have attempted to shed light on some of the aforementioned questions. Having critically reviewed the existing empirical literature, and isolated some remaining research questions, in chapter 3, I will present new findings from a series of on-line experiments that not only aim to shed light on some unresolved issues with respect to metaphor, but also endeavor to compare and contrast metaphor and hyperbole for the first time using psycholinguistic paradigms.

2 ADULT EMPIRICAL RESEARCH INVESTIGATING FIGURATIVE LANGUAGE PROCESSING

This chapter will be dedicated to the presentation of existing empirical findings that shed light on some of the questions we were left with after having discussed the details of the current accounts of metaphor. Are metaphors as quick to process as comparable literal statements, as current theories suggest? Similarly, are metaphoric interpretations available right from the beginning of processing? Do the activation levels of relevant and irrelevant properties associated with the lexically encoded vehicle concepts differ after arriving at a metaphoric interpretation, as many of the accounts suggest? Does the deactivation of irrelevant information result from passive decay (due to lack of attention), or are these properties/features actively suppressed in order to avoid interference? Are familiar and unfamiliar metaphors processed differently?

Most empirical research investigating the processing of figurative language has focused on metaphor. The large bulk of experiments have been designed to investigate what it is we are doing, or what processes our cognitive mechanisms are engaging in when we understand metaphorical statements. Interesting findings have come out of such studies; many of which I will discuss in this chapter. To the best of my knowledge, however, there have been no significant published psycholinguistic studies investigating hyperbole despite recent lexical pragmatic unified theories, which explicitly aim to account for all types of lexical adjustment, including metaphor and hyperbole (Wilson and Carston 2007; Recanati 2001; 2004). However, some research has investigated hyperbolic irony, which I will discuss after reviewing the empirical literature investigating metaphor.

Firstly, I will briefly summarize the current accounts discussed in chapter 1.

Current pragmatic and psychological accounts

Psychological and pragmatic categorization/concept construction accounts propose that metaphors serve to categorize topics within an ad hoc, occasion specific category which is derived from the vehicle term, thus allowing features of that ad hoc category to be projected from the vehicle to the topic (Sperber and Wilson 2006; Wilson and Carston 2007; Glucksberg and Keysar 1990). The Relevance Theoretic categorization account (Wilson and Carston 2007) (section1.6.1) proposes that it is an expectation of relevance that guides our selection of relevant features with which to construct our 'ad hoc concept', where the Class-inclusion categorization account (Glucksberg and Keysar 1990) (section 1.6.2) claims it is the topic's dimensions of attribution, as well as the prototypical features of the metaphor vehicle which guide our construction of the ad hoc category of which the metaphor vehicle is an exemplar.

In contrast, the Structure-Mapping account (section 1.6.4) (Clement and Gentner 1991; Wolff and Gentner 2011) claims that metaphoric statements are processed as comparison statements, rather than as categorization assertions. Gentner and colleagues state that novel metaphor comprehension involves the structural alignment of the topic and vehicle concepts, and the subsequent projection of relevant predicates from the vehicle to the topic.

The Graded Salience Hypothesis (GSH) (1997,1999) (section 1.6.3) proposes that it is salience rather than literality/ non-literality, or contextual relevance, that determines the initial processes involved in metaphor comprehension (or any utterance comprehension), but does not state whether metaphors are processed as categorization assertions or comparison statements.

Finally, the Direct Access (DA) account (section 1.6.5) claims that pre-existing conceptual mappings are utilized during the processing of seemingly novel metaphors.

Each of these accounts makes a number of testable processing predictions in relation to the research questions mentioned in the introduction to this chapter.

Psychological predictions

Are metaphors as quick to process as comparable literal statements, and are metaphoric interpretations available from the beginning of processing?

All of the above accounts, with the exception of Giora's Graded Salience Hypothesis (which posits a sequential processing model for novel metaphors) propose some sort of 'parallel processing model' which means that we are not required to go via the literal interpretation of a figurative statement in order to arrive at an appropriate novel metaphoric interpretation. Thus, on this basis at least, these accounts predict that a) all other things being equal, metaphors should take no longer to process than literal statements, and b) metaphoric interpretations should be available right from the beginning of processing.

Do the activation levels of relevant and irrelevant properties associated with the lexically encoded vehicle concepts differ after arriving at a metaphoric interpretation?

The Relevance Theoretic account, the class-inclusion account, and the Structure mapping account, all entail that metaphor inconsistent features become deactivated during the comprehension of novel metaphors (either due to lack of attention or as a result of active suppression. See section for discussion of the mechanism of suppression). Therefore, these accounts would predict that activation levels of metaphor inconsistent features of the vehicle would be significantly lower in a metaphor biasing context, than in literal or neutral biasing context.

However, in contrast, Giora's Graded Salience Hypothesis (1997, 1999, 2002, 2003) states that the contextually incompatible 'literal' meaning of a metaphor is not discarded at all in a metaphor biasing context, provided it plays a role in the construction of the compatible meaning, and that it does not 'disrupt' the derivation of the compatible, metaphoric interpretation. Therefore, the Graded Salience Hypothesis

makes the opposite prediction to the other accounts with respect to metaphor inconsistent feature activation levels in a metaphor biasing condition. Giora would not expect to see any difference in activation levels of metaphor inconsistent features of the vehicle concept in metaphor, literal or neutral biasing contexts.

Are familiar and unfamiliar metaphors processed differently?

All the current accounts discussed in chapter 1 (the Relevance Theoretic account, the class-inclusion account, the Graded Salience Hypothesis, the Structure-Mapping account, and the Direct Access account) predict that familiar and/or conventionalized metaphors may be easier to process than novel metaphors.
Relevance-theorists explicitly state that their account is intended as a model of novel figurative language comprehension, whereas highly conventionalised figurative statements (e.g. She is an Angel) most likely undergo a faster, less attentional process of disambiguation (Swinney 1979), as such conventionalised metaphor vehicles have most likely become polysemous through frequent use in a metaphoric context (Wilson and Carston 2007:26).

Furthermore, Glucksberg (2001:112) states *"...metaphors become conventional [when they] ideally represent their attributive categories' i.e. they become prototypical of the 'originally' ad hoc category referred to in frequently used metaphors, and thus may go on to lexically encode the 'ad hoc category'. In such instances, the hearer would be able to retrieve the intended meaning from long-term memory."*

Giora posits processing distinctions between novel and familiar metaphors, since she states that in the case of familiar metaphors (not just highly conventionalised, but in any way familiar), both salient literal and metaphoric meanings are available from the beginning of processing, however there is only one salient meaning available during the initial processing of a novel metaphor; the metaphoric meaning must be subsequently arrived at.

Finally, not only does the Direct Access account entail that familiar metaphors (i.e. My sister is an Angel) and novel metaphors based on an existing metaphorical mapping (i.e. My day has been a tsunami) will be quicker to process than completely

novel metaphors (e.g. My family is a mirror) because there are relevant, stable conceptual mappings already in place in long-term memory.

In addition to the above predictions, each of the accounts make their own theory specific predictions (see section 1.7 for full discussion), which we will also be able to measure up against the findings discussed in this chapter.

2.1 ADULT METAPHOR FINDINGS

In this section, I will review the adult empirical literature in relation to the series of questions discussed above, which presented themselves after careful consideration of the current theoretical accounts of metaphor comprehension.

2.1.1 FINDINGS FOR AND AGAINST A NON-SEQUENTIAL ACCOUNT OF METAPHOR PROCESSING

Does the evidence suggest that metaphor comprehension involves sequential stages of processing, starting with the arrival at a default literal interpretation?

Evidence against a sequential processing model

As discussed in chapter 1, early accounts of metaphor comprehension, although different in their approaches, share the assumption that metaphor is derived from the literal meaning, which is processed first. This standard assumption has largely been rejected on the basis of a number of studies, which show that the comprehension of metaphoric utterances can be as quickly and as readily accessible as comparable literal expressions.

Ortony, Shallert, Reynolds and Antos' (1978) findings suggest that metaphorical interpretations are as quick to arrive at as literal interpretations.

Reading times of sentential metaphors such as *"regardless of the danger, the troops marched on"* placed in a literal context (*"Approaching the enemy infantry, the men worried about setting off land mines. They were anxious that their presence would be detected prematurely. Their fears were compounded by the knowledge that they might be isolated from their reinforcements. The outlook was grim.")*, and in a metaphoric context (*"The children continued to annoy their babysitter. She told the little boys she would not tolerate any more bad behaviour. Climbing all over the furniture was not allowed. She threatened to spank them if they continued to stomp, run and scream around the room. The children knew that her spankings hurt.")* were compared.

When the context passage consisted of only the 1st sentence of the context, plus the target sentence (short context condition), reading times following the literal context were significantly quicker than proceeding the metaphoric context. However, when the full context was used (long context condition), the difference disappeared. Thus, provided there was enough context, there was no difference in reading times between metaphor and literal conditions. The authors venture that this was presumably because without a properly supportive context, there remained some ambiguity over the intended meaning of the utterance, which caused a processing delay in the short context condition.

This experiment was replicated by Inhoff, Lima and Carrol (1984). However, rather than looking at time, they tracked eye fixations on appropriate words as participants read each sentence. As before, both short and long contexts were used. Again, the subjects read metaphors just as quickly as literal sentences, but this time it was regardless of the context length. This methodology has been criticized because it only used eye-tracking; comprehension questions were not included. This means that we can't be sure whether the sentences were actually being understood metaphorically.

Blasko and Connine (1993) used a cross-modal priming study to assess the processing of metaphors more accurately. Participants listened to metaphorical phrases in neutral contexts, such as *"Jerry first knew that loneliness was a desert....when he was very young"*. While the participants were listening, a letter string would appear on a computer screen either immediately after, or 300ms later. When the visual target appeared, the participants had to decide as quickly and as accurately as they could, whether or not it was an English word. On half the trials, the target was a word and on

half it was a non-word. There were three types of word, targets defined in terms of their relation to the metaphorical phrase: metaphorical, literal and control (e.g. *isolate*, *sand* and *moustache*). Faster lexical decisions to metaphorical or literal targets relative to control targets would indicate activation of metaphorical or literal meanings, respectively. Decisions for literal targets were faster than controls both immediately, and after 300ms delay, indicating that literal meanings were always activated. Metaphorical targets were also activated faster than controls at both delays, but only when metaphors were considered to be apt, e.g. when they were rated as good metaphors by an independent group of experimental participants.

In the studies discussed above, participants were either explicitly or implicitly asked to focus on and comprehend metaphorical interpretations. In doing so, investigators were able to determine the processing times of metaphoric statements over literal statements in order to determine whether a sequential, literal first processing model is plausible. However, another way to test the plausibility of literal first accounts is to determine whether metaphoric interpretations are non-optional and therefore available right from the beginning of processing, or whether they are optional and generated only if the literal meaning is 'defective' and not informative enough, as might be seen to be suggested by Grice and has been maintained by Neo-Griceans (Clark and Lucy 1965; Janus and Bever 1985; Lyons 1977). Indeed, a series of studies have found that metaphoric interpretations are non-optional and available from the beginning of processing, providing further evidence against a sequential account (Glucksberg, Gildea & Bookin 1982; Keysar 1989; McElree and Griffith 1995; and McElree and Nordlie 1999).

Glucksberg, Gildea & Bookin (1982) adapted Stroop's (1935) task, which illustrated that people cannot ignore literal linguistic meanings. Stroop presented colour words printed in various colours and asked people to name the colour of the ink, not read the words themselves. When colour words were printed in any colour other than the one they referred to (e.g. Yellow), people found it difficult to name the colour of the ink, indicating that they were experiencing competition from the involuntary reading and processing of the words. People seemed not to be able to inhibit their reading of words.

Glucksberg et al. (1982), hoped that this logic would apply to metaphorical interpretations. These interpretations would be hard for participants to inhibit, even when a given task required them to only interpret a sentence literally. Participants were shown a series of sentences (*some roads are snakes; some offices are icebergs*), and asked to judge whether the sentence was literally true or literally false. Four types of sentences were used: literally true, literally false, metaphors (but literally false), and scrambled metaphors. If the participants were able to just ignore the metaphorical interpretations, then they should not take any longer to judge the metaphors as false, than they do to judge the scrambled metaphors as false. If however, participants do automatically have the metaphorical interpretations available, then they should take longer to judge the metaphor sentences as false, than they do to judge the scrambled metaphors. Indeed, for appropriate metaphors, there will be competition between the true non-literal meanings, and the false literal meanings of the metaphor sentences.

Glucksberg et al. (1982) found that participants were significantly slower to judge the metaphorical interpretations as literally false, than they were to judge the scrambled metaphors as so. They therefore concluded that metaphorical interpretations are available automatically and are non-optional, even when their availability inhibits performance on a given task.

McElree and Nordlie (1999) carried out an additional experiment using the same truth value judgment task, but they also added a 'meaningfulness judgment task' to see whether literal falsehood interfered with participants' ability to judge that 'true' metaphors were indeed meaningful. In addition, they used a response deadline procedure, in which participants are forced to respond within a certain time frame.

They found speed-accuracy tradeoff functions (in which the tradeoff between speed and accuracy is measured when carrying out a given task (Fitts 1954) that were consistent with a system that used parallel information sources with equal time-courses, when people made both literal truth judgments and meaningfulness judgments about metaphorically true sentences. They concluded that people generate literal and metaphorical interpretations in parallel rather than sequentially, and the time-courses for the two parallel processes are the same. On this basis, the authors concluded that neither literal, nor metaphorical interpretations are default.

In contrast with the usual focus on metaphor, Frisson and Pickering (1999) carried out an eye-tracking study investigating metonymy. Metonymy is a trope in which a category is referred to not by its own label, but by another term, the denotation of which is broadened to include that category (e.g. 'table 3 left without paying' or 'the whole house went to the party'). Frisson and Pickering (1999) found that hearers are able to obtain place-for-event and place-for-institution metonymic interpretations as soon as the target word is encountered (inferred by a lack of disruption in the eye-movement record). However, words with no relevant metonymic interpretation caused disruption in the eye movement record. The authors argue that the results are incompatible with a literal-first model of figurative language processing, but that they support a parallel processing model.

Summary of evidence against a sequential account of metaphor processing

The studies discussed above, indicate that metaphor comprehension does not seem to be optional, more complex to process, or dependent on first ascertaining the literal interpretation of the utterance. On the contrary, they suggest that the encoded content and the contextually appropriate content are processed in parallel. On the basis of these findings, current theorists have rejected, as discussed in Chapter 1, standard 'literal first' approaches to metaphor comprehension (Glucksberg and Keysar 1990; Wolff and Gentner 2011; Wilson and Carston 2007; Gibbs 1990).

One criticism that could be directed at some of the studies discussed above is related to the familiarity of the metaphoric items used (Ortony et al. 1978; Inhoff et al. 1984; Blasko and Connine 1993). Items included expressions such as 'the troops marched on' and 'loneliness was a desert'. Glucksberg and colleagues' study (Glucksberg et al., 1982) also used some highly conventionalised metaphoric expressions such as '*some roads are snakes'*. Given empirical evidence suggesting that familiar metaphors are easier to process than novel metaphors (Blasko and Connine 1993; Blank 1988; Gentner and Wolff 1997), and theoretical accounts which posit different comprehension procedures for conventional and novel metaphors (Glucksberg 2001:99; Wilson and Carston 2007:26), it is likely that the use of conventionalised materials skewed these findings. Moreover, not all studies have found evidence of metaphors being as quick and/or easy to process as equivalent literal statements. Some studies with conflicting findings are discussed below.

Evidence in support of a sequential processing model

Despite the build up of evidence that is potentially indicative of a non-sequential account, we are not without evidence that fits with a sequential processing model.

Gold, Faust and Goldstein (2010) avoided the criticisms leveled at reading-time studies presented as evidence against a sequential processing model by including both conventional and novel metaphors in their stimuli, as two separate conditions. In contrast with the previous findings, Gold and colleagues found that reading times were shorter for both statements containing literal word pairs (*soft blanket*) and conventional metaphors (*juicy gossip*) over those containing unrelated word pairs (*sink dispute*) and novel metaphors (*wilting hope*), suggesting that novel metaphors do take longer to process than literal statements.

Lemaire and Bianco (2003) also found a reading-time difference between metaphors and literal expressions, but this time with respect to referential metaphors. They found that (referential) metaphors (e.g. the scientist) took longer to read than literal referential statements (e.g. the boy) when embedded within a context passage:

e.g.(translated) Aged 10, Pierre is a surprising **child.**
He likes teasing girls with his friends.
It does not prevent him from being serious at school.
One day, he was playing with his mother.
Someone said: "Who knows the origin of the Olympics?"
The **boy/scientist** exclaimed: "It's the Greeks!".
The instructor turned round.

Similarly, Gibbs (1990) presented participants with a series of stories, each of which contained some narrative setting and dialogue between people, and an early sentence in each story contained a noun referring to some person. This noun was then referred to again in the last sentence of the story either using a metaphoric referring expression, or a literal referring expression. Like Lemaire and Bianco (2003), Gibbs found that participants took longer to read the final sentence of the story when it contained a metaphoric referring expression than when it contained a literal referring expression. Gibbs does not take his findings as support for a sequential account. Rather, he argues that the reading time difference may be caused by the fact that the

referential metaphors used in his experiment did not explicitly compare two concepts in the way that the predicative metaphors of the form X is Y used in previous studies did, which he argues *"....probably made these figurative expressions particularly difficult to comprehend"* (Gibbs 1990:60).

Onishi and Murphy (1993) lend support to Gibbs' theory. They found that metaphors were understood as quickly as literals when the two terms were located in the same sentence (e.g., That boxer is a creampuff); yet, metaphors were harder to interpret than literal comparisons when the two terms were expressed in separate sentences. However, contrary to this claim, the metaphors used in some of the studies which found no difference in reading-times between metaphoric and literal statements were also referential (e.g. 'the troops marched on')(Ortony et al., 1978; Inhoff et al., 1984).

Noveck, Bianco and Castry (2001) also found there to be a time cost to metaphor processing among 9 to 14 year olds. They found longer reading times for metaphors over literal statements among developing readers. Noveck and colleagues argue that the neutral contexts (e.g. lines (a)-(f), and (h)) in which their metaphoric items (line (g)) were placed led to the reading-time difference.

e.g. (translated)
(a) The second-grade pupils went to the pool with their teacher.
(b) The lifeguard organized a few games for them.
(c) He then asked that they do a few laps.
(d) Before the end of the class, the phone rang.
(e) The lifeguard went to answer it.
(f) Returning, he cried out:
(g) "All toads to the side of the pool."
(h) The class went to the lockers and back to school.

The authors claim that previous findings suggesting that metaphors are as quick and easy to process as literal statements are the result of the particular contexts used in the experimental materials. They argue that there are often richer, more supportive contexts in the metaphoric conditions than in other conditions.

"...any claims about effort are relative to a provided context."
(Noveck et al. 2001:12).

Noveck and colleagues do not see their findings as support for a sequential model of metaphor processing. Instead, they argue that the data support a Relevance Theoretic account of metaphor; if hearers aim to maximize cognitive effects, and metaphors have the potential to yield more cognitive effects than literal statements (which they claim is the case), and an increase in cognitive effects correlates with an increase in processing effort, then all other things being equal (as their neutral contexts control for), metaphors should take longer to process than literal statements.

Janus and Bever (1985), on the other hand, do interpret their reading-time findings as support for a sequential account. Their revealed that metaphors (e.g. 'The fabric had begun to fray' referring to a troubled marriage) required significantly longer reading times over literal statements. Although they interpret their findings as evidence of a sequential or 'serial' model of metaphor processing, they argue that the machinery behind literal and metaphoric may well be the same (i.e. context being used to pragmatically adjust interpretations), but that metaphoric language may consistently require more support from the context than literal statements.

Arzouan, Goldstein and Faust (2007) used Event Related Potentials (ERPs)[19] to compare the processing of novel metaphors, familiar metaphors, and literal statements. They found that N400 amplitude[20] increased from literal statements, through familiar metaphors, with the greatest amplitude corresponding to novel metaphor comprehension. In addition, novel metaphors also elicited a 'right-sided late negativity' (delayed N400 residing in the right hemisphere), suggesting continued attempts to reconcile the lexically encoded content with the context. The authors interpret these findings as support for a sequential model of novel metaphor comprehension in which an initial context incompatible interpretation must be arrived at and rejected on the base of poor contextual fit, before an accurate 'metaphoric' interpretation can be arrived at. However, an N400 component is generally regarded as an index of the degree of mismatch between a word and a previously established semantic context (Luck 2005) and cannot tell us anything about the processing of the

[19] An Event Related potential (ERP) is a form of brainwave which consists of peaks and troughs which 'reflect the sum of several relatively independent underlying or latent components'. (Luck 2005)

[20] The N400 component is regarded as an index of the degree of mismatch between a word and a previously established semantic context, and it is often used to determine which of two sets of words is perceived as being more incongruous. (Luck 2005)

utterance as a whole. As we saw in Chapter 1, the Relevance Theoretic lexical pragmatic account (Wilson and Carston 2007) still holds that words have a literal interpretation that is accessed prior to arriving at the proposition expressed, which would explain a finding of greater N400s during the processing of a metaphoric utterance in which the lexically encoded vehicle concept would not fit with the context. In short, Arzoun and colleagues' findings can be explained by literalness at the local (lexical) level, rather than having to appeal to the notion of a default literal interpretation of the entire utterance.

Summary

There is a substantial body of evidence against a sequential model of metaphor processing (Ortony et al. 1978; Inhoff et al. 1984; Glucksberg et al. 1982; Keysar 1989; McElree and Griffith 1995; and McElree and Nordlie 1999). In light of the contradictory reading-time findings (Gold et al. 2010; Lemaire and Bianco 2003; Gibbs 1990; Noveck et al. 2001; Janus and Bever 1985), it is perhaps the findings from alternative paradigms (speed-accuracy trade off, truth value judgment tasks, lexical priming) which most strongly support a parallel processing model, and therefore, the current accounts which are not based on the 'literal first' assumption.

2.1.2 FINDINGS INDICATING EFFECTS OF FAMILIARITY

Are familiar and unfamiliar metaphors processed differently?

All of the current theoretical accounts discussed in Chapter 1 are consistent with findings suggesting that conventionality facilities metaphor processing (Blank, 1988; Blasko & Connine, 1993; Gentner and Wolff 1997; Gernsbacher, 1984; Camac & Glucksberg, 1984; Gildea & Glucksberg, 1983; Glucksberg, Gildea, & Bookin, 1982; Martin, 1992; Grauwe; Swain, Holcomb and Kuperberg 2010).

Blank (1988) used a word naming task to investigate the processing of several different types of lexicalized metaphors (i.e. metaphors in which the metaphoric meanings of the vehicle term are thought to be lexically encoded) taken from Lakoff

and Johnson (1980), (e.g. *time is money* and *love is a sickness)*, as well as novel, poetic metaphors. Participants were presented with a series of incomplete sentences (with the remaining few words missing), and were asked to complete them. Blank found that the last word of highly familiar conventional metaphors, such as "spend your weekend," were named as fast as their literal counterparts ("spend your income"). However, naming the last word of novel poetic metaphors, such as "I heard the thunder gossip," took longer than in the literal condition, i.e. "I heard the thunder rumble."

Blank (1988) argues that his findings are indicative of a two stage process in which the lexicon is first checked for relevant encoded senses, and if no such sense is found, an automatic check for an alternative, appropriate interpretation begins. This would explain why conventional metaphors, which are likely to have an appropriate lexically encoded sense would be quicker to process than novel metaphors in which the only lexically encoded sense is the 'literal' one.

However, like Blasko and Connine (1993), I would argue that Blank's study has certain, key limitations. Blank did not collect familiarity ratings for his materials, instead familiarity was determined post hoc on the basis of naming times, and sensibleness ratings. Furthermore, the novel metaphors used were rated as less 'sensible' than the anomalous control items (1.1 for novel metaphors and 1.3 for anomalous items, on a scale of 1 (low)-5 (high)). This is most likely because the novel metaphors were sourced from poetry and were therefore, rather obscure. Blasko and Connine also rightly point out that many of the familiar metaphors were in fact 'stock phrases' (e.g. spending your time) rather than familiar metaphors. The items used in Blank's study clustered around polar extremes with highly familiar metaphors (in which the 'figurative' sense has been lexicalized as an additional sense, e.g. spending) at one end, and highly novel metaphors, that may never have been encountered before, and that lack the high degree of contextual relevance that some entirely new metaphors have in every day speech, at the other end. It seems more appropriate to treat familiarity as a continuum.

Blasko and Connine (1993) report similar findings from a cross-modal lexical priming study. They presented metaphorical sentences (e.g. *The belief that HARD WORK IS A LADDER is common to this generation*) auditorily, and asked participants to make a

lexical decision about a visually presented target. The visual targets were either a word related to the metaphorical meaning (e.g. *advance*), a word related to the literal meaning of the final word of the metaphor (e.g. *rungs*), or a control which was unrelated to both the metaphor and the final word (e.g. *Pastry*). Only nominal/predicate metaphors (X is Y) were used. The metaphorical sentences varied in familiarity across conditions, but were comparable in aptness. In Experiment 1, the visual target was presented immediately at the offset of the metaphorical vehicle, while in Experiment 2, the visual target was presented 300 ms later in the sentence.

Like Blank (1988), Blasko and Connine (1993) found that reaction times differed depending on familiarity at both time delays (immediately after the offset of the metaphor vehicle, and 300ms later). The highly familiar condition showed facilitation for both the literal meanings of the final word of the metaphor (e.g. *rungs*) and the metaphorical meanings (e.g. *advance*), in comparison with the controls which were unrelated to both the metaphor and the final word (e.g. *Pastry*), suggesting that both the meaning of the metaphor and the literal meaning of the final word in the metaphor were available. In contrast, the low-familiar condition showed facilitation only for the literal meanings of the final word of the metaphor. The metaphorical meanings were actually slower than the controls, suggesting that the metaphorical meanings were not immediately available for unfamiliar metaphors.

In addition, Grauwe, Swain, Holcomb and Kuperberg's (2010) ERP findings reveal that conventionalised metaphors elicit no larger N400s than literal statements, suggesting that conventional metaphors require no more processing effort than comparable literal statements.

The findings discussed in this section are suggestive of processing differences between familiar and unfamiliar metaphors with respect to the speed at which they are processed, the processing effort required, and the immediate availability of a metaphoric interpretation. This pattern is consistent with all the current accounts discussed in Chapter 1, as each account posits some way in which conventionalized/familiar metaphors are processed differently from novel/unfamiliar metaphors.

The theoretical accounts do differ with respect to how familiar or novel a metaphor

needs to be to warrant a different comprehension procedure. Relevance theorists (Wilson and Carton 2007), Gentner and colleagues, and Glucksberg and colleagues (Glucksberg and Keysar 1990; Glucksberg 2001), for example, only posit a distinct processing model for the most highly conventionalized metaphors, which, they argue, will have acquired an additional sense through such frequent use. Whereas, as any account based on salience would have to predict, the Graded Salience Hypothesis entails that any metaphor that is at all familiar will be quicker to process than one which is not, because both a literal and a metaphoric interpretation will be available right from the beginning of processing in the case of the familiar metaphor. However, in the case of the completely novel metaphor, only a literal interpretation will be available at first. As it is impossible to determine whether the metaphors used in the studies discussed in this section have additional encoded senses or not, it is difficult to say which of the accounts is more accurate in this respect.

2.1.3 FINDINGS RELATING TO CONTEMPORARY THEORETICAL ACCOUNTS

What empirical support is there for the theory specific claims made by each of the accounts?

Numerous studies have been carried out with the aim of providing evidence for or against the current theoretical accounts discussed in Chapter 1. Some findings contribute to the categorization vs. comparison debate by providing support for a categorization account over a comparison account, or vice versa. Other findings provide more specific evidence in support of, or against the specifics of certain accounts. Many of these findings are discussed below.

General support for concept construction accounts/categorization accounts over the Structure-Mapping account

Several studies provide evidence in support for the general claims and predictions made by the concept construction accounts.

Firstly, Glucksberg, McGlone and Manfredi's (1997) findings support the claims of the property attribution/categorization accounts (Glucksberg and Keysar 1990; Wilson and Carston 2007); namely that metaphors are understood as categorizations for the purpose of attributing properties from the vehicle to the topic term, rather than as comparisons (implicit similes).

Recall from the predictions laid out at the end of Chapter 1 that if metaphors are processed as category assertions, in which it is asserted that the topic is a member of the category denoted by the vehicle, then metaphors should generally be nonsensical when reversed. In line with the concept construction, categorization accounts, Glucksberg et al. found that less than 4% of metaphoric statements remained meaningful when reversed. Participants were required to paraphrase metaphors and reversed metaphors to indicate what the intended meaning might be.

Secondly, Glucksberg and Haught (2006) found potential evidence in support of the concept construction/categorization accounts and against the structure mapping account. They asked participants to rate metaphors and similes for aptness. As discussed in section 1.6.4, the Structure Mapping account predicts that novel metaphors are processed as comparisons (implicit similes) rather than as categorizations as their form suggests. Thus, Gentner and colleagues would predict that participants would find novel metaphorical comparisons more apt in simile form than in metaphor form. However, contrary to this prediction, Glucksberg and Haught's rating questionnaires found that novelty did not privilege comparison over categorization; novelty did not privilege simile over metaphor in terms of aptness.

Finally, in contrast with the Structure-Mapping prediction that novel metaphors are processed as comparisons, Jones and Estes (2006) found that aptness rather than conventionality predicts preference for metaphors over similes. This finding supports the concept construction accounts, which state that novel metaphors are processed as categorizations, rather than comparisons (Glucksberg and Keysar 1990; Wilson and Carston 2007). In three separate experiments, using three different paradigms, the authors manipulated conventionality by varying the vehicle concepts (some vehicles were novel and some were conventional) and manipulating aptness by varying the topic (e.g. *Dancers can be butterflies* is more apt than *Soccer players can be butterflies*).

The first experiment used the form preference task (based on Bowdle and Gentner 2005) in which participants indicate whether they prefer a given statement in metaphor or simile form. Experiment 2 (also modeled on Bowdle and Gentner 2005) measured comprehension latencies and assessed comprehensibility ratings. Finally, Experiment 3 used the metaphorical categorization task devised by Jones and Estes (2005).

Contrary to the predictions of the Structure Mapping Account (Clements and Gentner 1991; Wolff and Gentner 2011), but in line with the predictions of the concept construction accounts (Glucksberg and Keysar 1990; Wilson and Carston 2007) (see section 1.7 for discussion), the authors found that conventionality did not reliably affect metaphor processing: conventional metaphors were no more likely to be preferred in metaphor form than novel metaphors. Conversely, the findings did suggest that aptness affects choice of metaphor form over simile form, as well as processing speed, and processing effort.

If it is accurate to take preference for categorical or simile form as a reliable indicator of the form in which metaphors are processed, then this collection of findings strongly suggest that the Structure-Mapping account's claim that only conventionalized metaphors are processed as categorizations is inaccurate. Moreover, Glucksberg et al.'s reversibility findings suggest that the concept construction accounts, which predict a directional comprehension procedure in which properties of the vehicle are attributed to the topic, capture the processes underlying metaphor comprehension better than straight forward comparison accounts, which entail that metaphors should be reversible.

Specific support for the Class-inclusion account

Is there any evidence in support of the Class-inclusion accounts' claim that topics provide dimensions for attribution, while vehicles provide properties for attribution?

As well as the more general findings discussed above, Glucksberg, McGlone and Manfredi's (1997) findings also provide evidence for the Class-inclusion account's claim that the topic and vehicle terms play differing roles in metaphor comprehension.

Contrary to the predictions of the Structure Mapping account (see section 1.7), Glucksberg and colleagues found that comprehension of a given metaphor (e.g. *My lawyer is a shark*) is only facilitated by immediate prior exposure to the metaphor vehicle (e.g. *shark*), in the case of a certain kind of metaphors; namely those with high-constraining topics (*e.g. my lawyer)* and unambiguous vehicles (e.g. *shark*), rather than those with low-constraining topics (e.g. *my brother*) and ambiguous vehicles (e.g. *virus*). Glucksberg et al. (1997:63) argue that this effect arises because high-constraining topics may be characterized in fewer ways, and therefore they *"...generate fewer expectations than low-constraining topics regarding the dimensions upon which they were likely to be characterized by a vehicle"*. Likewise, unambiguous vehicles generate fewer expectations than ambiguous vehicles regarding which properties are potentially being attributed to the topic. The authors argue that as a result, it is *"high-constraint topics and unambiguous vehicles [that] offer more advance information when presented as primes than their low-constraint and ambiguous counter parts."*

Specific support for the Structure-Mapping account

Is there any evidence in support of the claim that novel metaphors are processed as comparisons rather than categorizations, or the claim that conventional metaphors are processed as categorizations rather than comparisons? Is there any evidence of an early neutral alignment process during metaphor processing?

A number of studies are interpreted by their authors as providing support for the Structure Mapping account and its sister account, 'The career of metaphor' over other current accounts (Zharikov and Gentner 2002; Wolff and Gentner 2000; Wolff and Gentner 2011; Gentner and Wolff 1997; Onishi and Murphy 1993; Gentner and Bowdle 2008; Coulson and Van Petten 2002; Onishi and Murphy 1993). However, as I will discuss, it is not always clear whether the findings exclusively support the Structure-Mapping account.

Recall that the Structure Mapping account predicts that the initial stages of metaphor comprehension involve neutral structural alignment – the role that the topic and vehicle concepts play is not considered at this stage. Gentner and Wolff (1997) found potential evidence of this alignment process in finding that metaphors were no

quicker to process in a context in which the vehicle had been primed, than in a context in which the topic had been primed.

The authors claim that the class-inclusion account predicts that metaphor comprehension should receive more facilitation from priming of the vehicle than from priming of the topic because *"whereas alignment first models begin with a comparison process, abstraction-first models [particularly the class-inclusion account] begin by finding or deriving an abstraction from the base [vehicle] which is then projected to the target [topic]"* (Gentner and Wolff 1997:336). This finding therefore provides evidence against such accounts.

However, it is not clear that the class-inclusion account predicts that priming of the topic would not also facilitate metaphor comprehension. Contrary to Gentner and Wolff's claims, the class-inclusion account does involve an early comparison process: *"A first step is alignment of the vehicle and the topic concepts so that dimensions of attribution of the topic can be matched against candidate properties of the vehicle" (Glucksberg 2001.p. 54)*. Thus, the topic is also involved in processing early on.

Coulson and Van Petten (2002) argue that their ERP findings also provide evidence of an early alignment process. They found that larger N400s were elicited when reading both 'literal mappings' (e.g. *What I thought was petty theft, the judge thought was grand larceny*) and metaphors (e.g. *I knew she was out to steal his heart, but that kiss was grand larceny*) than when reading straight forward 'literal statements' (e.g. *They just announced that the governor was charged with grand larceny*).

The authors argue (2002:966) that the amplified N400 in the metaphoric and literal mapping conditions is caused by the *"invitation to discover the similarity between two entities, and that the similarity between those entities is only partial",* and that these findings support the Structure mapping account over Glucksberg and Keysar's class-inclusion account because only the former posits this early alignment process.

However, as mentioned above, it is not clear that evidence of an early alignment process per se goes against the class-inclusion account, as the categorization account also proposes an initial comparison process. Moreover, the larger N400 elicited during the processing of metaphors (comparable to that elicited during the comparison of literal comparisons) could be attributed to any number of independent factors

affecting processing effort. Like most accounts of metaphor processing, categorization accounts also posit extra processing effort for metaphors over literal statements.

Onishi and Murphy (1993) argue that their findings provide evidence in support of the Structure Mapping account. They found that metaphors were understood as quickly as literal statements when the two terms (the topic and the vehicle) were located in the same sentence (e.g. *That boxer is a creampuff*). However, metaphors were harder to interpret than literal comparisons when the two terms were expressed in separate sentences. Therefore, the Structure-Mapping account's prediction that metaphor processing should be facilitated when the two terms being compared are close in the text is borne out in this data (as this triggers the predicate alignment process to begin). However, I would argue that this finding would be predicted by any account, as additional effort would be required for the hearer/reader to recall the topic term if it was heard/read in a previous sentence.

Alternative, potentially supportive evidence is presented by Gentner and Boronat (1992). They found that participants were faster to read novel metaphors that were an extension of a novel metaphor (i.e. that were reliant on the same domain mapping) that appeared earlier in the passage *(e.g. he had to steer his course carefully in the competition – his skill left his opponent far behind him at the finish line*), than they were to read novel metaphors that were preceded by an unrelated novel metaphor (e.g. *he had to steer his course carefully in the competition – he had to use every weapon at his command in the competition)*. The authors claim that this finding supports the Structure-Mapping claim that metaphoric mappings can be 'incrementally extended' in order to process extended metaphors (See section 1.6.4), and that such extensions of existing mappings can facilitate interpretation. Gentner and colleagues also point out that this finding is consistent with Gibbs' (1990; 1994) Direct Access account in which most metaphors are based on existing conceptual mappings (see below for further support for the Direct Access account).

Interestingly though, Gentner and Boronat did not find the same reading-time difference when they used conventional metaphoric items; conventional metaphors were not facilitated by being preceded by a related metaphor. The authors interpret this second finding as evidence for the 'career of metaphor' aspect of the Structure-

Mapping account. They argue that conventional metaphors may not be processed via structure mapping, but rather as categorizations, which would explain why they do not benefit from a recently constructed, related mapping.

Gentner and Boronat's findings nicely illustrate facilitation effects during novel metaphor processing. However, I would argue that Gentner and colleagues are not alone in predicting facilitation from a preceding, related metaphor when processing a novel metaphor. The class-inclusion account, the Relevance Theoretic account, the Graded Salience Hypothesis, and the Direct Access account all also entail that the presence of a related metaphor in the preceding linguistic context, would facilitate processing of a novel metaphor, as information relevant to the processing of the second metaphor would have received additional activation as a result of processing the preceding metaphor.

Perhaps one of the more robust findings in support of the Structure-Mapping account is presented in Wolff and Gentner (2000). The authors argue that their sentence verification findings suggest that initial processing is role-neutral (non-directional); a claim that is unique to the Structure-Mapping account. The alignment process posited, for instance, by Glucksberg and colleagues is not role-neutral; the topic and vehicle make different contributions to the comparison.

Wolff and Gentner (2000) found that the 'metaphor interference effect' (MIE) (See Glucksberg, Gildea & Bookin 1982, section 2.1.1) is present in both metaphors and reversed metaphors (i.e. participants were slower to judge reversed metaphors and forward facing metaphors, as literally false, than they were to do so with scrambled metaphors). The authors argue that this is evidence of an early neutral alignment process in which properties are matched, but directionality is not yet processed.

Furthermore, in line with the predictions of the Structure Mapping account (see section 1.7), they found that 'high-similarity' metaphors (i.e. metaphors in which the topic and vehicle terms have similar salient features, such as 'some Giraffes are skyscrapers') exhibited more of a MIE than 'low-similarity' metaphors (i.e. 'some plays are doors'), regardless of whether the metaphors had been reversed or not.

The authors interpret this finding as support for the early alignment process in general. If early alignment is quicker when the topic and vehicle are similar, then more predicates would have been matched (i.e. more sense would have been made of the comparison) at the point in which the participants are required to make the true/false decision, which means that the MIE would be greater in the high-similarity condition, as was the case.

However, it could be argued that this finding points to an early symmetrical alignment that is symptomatic of the verification task (because of the speed constraints associated with such tasks), rather than an early symmetrical alignment process that is a naturally occurring part of metaphor processing.

In a further series of experiments, Wolff and Gentner (2011) replicated their earlier findings. However, they argue that this time, by using a simpler task, they have ruled out the above alternative interpretation of their earlier (2000) findings. Participants saw both forward and reversed versions of the same series of high similarity and low similarity metaphors used in Wolff and Gentner (2000), and were required to make a comprehensibility judgment about the sentence after one of 5 possible time delays (1200ms; 600ms; 500ms and 1800ms; 1600ms). Here, they found no difference in comprehensibility ratings between forward and reversed metaphors at the earlier delay (either 600ms, or 500ms). However at the later deadlines forward metaphors had significantly higher comprehensibility ratings than reversed metaphors. Moreover, they could be sure that processing had begun at the early delay because scrambled metaphors were already judged to be less comprehensible than both forward and reversed metaphors at the early delay. These findings suggest that directionality is not considered early in processing, but that it does become a factor later on in processing, as the Structure Mapping account claims.

It is unclear how such evidence for an early neutral alignment process can be explained within the framework proposed by Glucksberg and colleagues, since they maintain that the topic and vehicle are compared on the basis of different features; vehicle properties on the one hand and topic dimensions on the other are the relevant inputs for comparison. Therefore, the comparison process is, by definition, not role-

neutral.

However, it is worth noting at this point that there is some disparity between the objectives of the Structure Mapping and Class-inclusion account, which results in stylistic differences between the two accounts.

The Structure Mapping account has a temporal dimension; Gentner and Colleagues posit step-by-step comprehension processes and mechanisms, which means that they are able to make predictions regarding events which might or might not be taking place at different delays during processing (i.e. early initial neutral alignment followed by subsequent directional projection of predicates).

The class-inclusion account on the other hand, is an 'end state' or 'outcome' account. Glucksberg and colleagues were concerned with a) how we recognise metaphors as such, b) how we infer their intended meaning, and c) what that intended meaning might be. In addressing these concerns, they did not posit step-by-step comprehension processes, and thus cannot necessarily be held to account for evidence of events taking place at different time delays.

It could be argued that Wolff and Gentner's (2000; 2011) findings suggest that at the earliest testable stage of processing (500ms), participants have merely 'accessed' the topic and vehicle concepts, and that before 'processing proper' has begun, they are interrupted by the request to judge comprehensibility. In order to answer this request, they quickly compare the respective concepts, and thus, rightly judge the forward and reversed metaphors to be more 'comprehensible' than the scrambled ones.

Neither categorization account claims that such initial 'accessing' of the topic and vehicle concepts does not take place, and thus, in light of this alternative interpretation of the data, Wolff and Gentner's (2000; 2011) arguments do not appear as robust as they claim.

Even without the above clause, it is worth noting here that although the Relevance Theoretic concept construction account does not discuss an early neutral alignment process, evidence of such a process is not inconsistent with the Relevance Theoretic account. The Relevance Theoretic processing model for lexical broadening is such that the surrounding linguistic content affects the activation levels of encyclopaedic properties associated with the encoded concept. Therefore, among other things, the

topic dictates which features of the vehicle concept become highly activated. For example, in the metaphor 'The politician's speech was noxious', the 'topic' of the metaphor 'The politician's speech' would prime particular encyclopaedic properties of the encoded concept NOXIOUS (e.g. unpalatable, distasteful, dangerous). Features associated with the concept NOXIOUS which could not be applied to 'the politicians speech' would not be highly activated.

Later on during processing, like the Class-inclusion account and the Structure-Mapping account, Relevance Theorists propose that the processing model becomes direction specific, as features must be attributed to the topic from the vehicle. However, evidence of an early directionless processing stage in which the topic and vehicle concepts are aligned is consistent with the earliest stages of processing posited by Relevance Theorists. According to the Relevance Theoretic account the encoded content is decoded and a range of logical and encyclopaedic properties associated with the lexically encoded constituents are activated on the basis of their relationship to one another and the surrounding context. Thus, contrary to the Class-inclusion account which posits different roles for the topic and vehicle concepts right from the beginning of processing, the Relevance Theoretic account would not have difficulty explaining evidence of an early stage in processing in which the topic and vehicle are considered in relation to one another.

Summary

The studies discussed in this section yield some very interesting findings that contribute considerably to our understanding of metaphor processing - i.e. evidence of facilitation effects from preceding metaphors, the proximity of the topic in relation to the vehicle in the discourse, and the existence of related stable concepts, as well as evidence of an early alignment process. However, it is not clear that the findings discussed in this sub-section favour the Structure-Mapping account over any of the other accounts discussed in Chapter 1.

Support for the Direct Access View

Is there any evidence in support of the claim that the vast majority of metaphors (including fairly novel ones) are processed via a network of stable mappings between domains in our mental lexicon?

As I discussed in section 2.1.1, empirical evidence has lent support to the notion that metaphoric interpretations can be accessed directly, without going via a default, literal interpretation. However, the question remains at to whether there is any more specific evidence in support of the facilitating role conceptual metaphors might have on our comprehension of metaphors. I am not aware of any such evidence with respect to metaphors, but Gibbs and colleagues present some idiom findings that, they argue, provide support for the Direct Access account. Although the processing of idiomatic expressions is not the focus of this thesis, these studies deserve some attention here.

Firstly, Gibbs and O'Brien (1990) report findings from a series of studies demonstrating that people's mental images for idioms are constrained by other, related conceptual metaphorical mappings. They found that participant's images of the idioms '*blow your stack'*, '*flip your lid'*, and '*hit the ceiling'* share similar characteristics such that stacks are blown, lids are flipped, and ceilings are hit because of internal pressure that causes the involuntary release of some substance upward in a violent manner.

Gibbs and Obrien argue that the consistency of meanings for different idioms with similar figurative interpretations results from the influence of stable conceptual metaphoric mappings that provide a mapping between an idiom and its figurative meaning. On the other hand, the authors argue that mental images for non-idiomatic phrases, such as '*blow your tire', 'flip your hat'*, or '*hit the wall'*, are much more varied because those phrases are not motivated by pre-existing conceptual metaphors.

I would argue that, though interesting in its own right, this finding does not support the Direct Access account over other accounts. Evidence suggesting that many idioms pertain to similar mappings between domains does not constitute evidence for an account in which metaphor interpretations, both familiar and unfamiliar, are accessed directly from existing, stable mappings in long-term memory. This finding does not rule out the possibility that figurative interpretations are constructed on-line during processing, regardless of pre-existing relevant domain mappings.

Secondly, Nayak and Gibbs (1990) argue that their findings suggest that the metaphorical description of emotion concepts like anger (e.g. anger is animal

behavior, and anger is a heated fluid in a container) in discourse contexts facilitates participants' understanding of different idiomatic phrases, such as '*bite your head off*' and 'blow your stack'. Subjects were presented with short scenarios as shown in (1) and (2) and rated how appropriate the target sentence was to their corresponding prior context on a 1-7 scale.

(1) ANGER IS A FEROCIOUS ANIMAL *Mrs. Simmons is a bear about cleanliness. Her house is always sparkling clean. She's always prowling around the house with a duster in her hand. She attacks every spot of dust like a personal enemy. It's not easy on her kids. She watches them like a hawk to see whether they make a mess. The moment they become a little careless, she*

a. *bites their heads off* (metaphorical congruence)

b. *blows her top* (metaphorical incongruence)

(2) ANGER IS HEAT IN A PRESSURIZED CONTAINER *Mrs. Simmons is a stickler for cleanliness. She is always very tense when she is cleaning her house. It makes her fume when her family does not cooperate. She gets hot every time she finds another dusty spot. The pressure really builds up when she is cleaning her kids' rooms. Her tolerance of their untidiness really reaches its limits. And when they walk in carelessly with muddy feet, she*

a. *blows her top* (metaphorical congruence)

b. *bites their heads off* (metaphorical incongruence)

The authors found that in example (1), target sentence a. was rated significantly more appropriate than target sentence b., and the opposite was true for example (2). The authors argued that this congruency effect is evidence of existing, stable mappings between domains being used when interpreting idioms.

Although the authors highlight one interpretation of their findings, I would argue that there is at least one other plausible interpretation of these data. The task is such that participants are asked to rate the appropriateness of an idiom in relation to a preceding text. Clearly, the findings suggest that 'after the fact' participants are able to detect that the target sentence (b) and the preceding text (1) pertain to different conceptual

mappings, and thus, they judge the target sentence to be less appropriate than one that pertains to the same conceptual mapping (a). This 'after the fact' judgment tells us little about the on-line processing of the target sentences. Contrary to Nayak and Gibbs' claims, we cannot be sure that when processing the target sentence on-line, participants used the conceptual mapping from the preceding text, to interpret the target sentences.

Finally, Gibbs (1992) presents findings from a study in which participants were asked questions about their understanding of events corresponding to particular source (vehicle) domains in various conceptual metaphors (e.g. the source domain of heated fluid in a container for the metaphor anger is heated fluid in a container). For example, when presented with the scenario of a sealed container filled with fluid, the participants were asked something about causation (e.g. "What would cause the container to explode?"), the intentionality (e.g. "Does the container explode on purpose or does it explode through no volition of its own?"), and manner (eg. "Does the explosion of the container occur in a gentle or violent manner?")

Gibbs found that the participants were remarkably consistent in their responses to the various questions (78% when averaged across the difference source domains and questions). For example, participants responded that the cause of a sealed container exploding was the internal pressure caused by the increased temperature of the fluid inside the container, and that the explosion was unintentional because containers and fluid are not agents, and finally that the explosion occurred in a violent manner. Perhaps more importantly, participants' intuitions about various source domains mapped neatly onto their conceptualisations of different target domains, in very predictable ways.

Gibbs argues that this data illustrates how the metaphorical mappings between source and target (topic) domains in long-term memory directly influence people's understanding of idioms, suggesting that conventional idiomatic expressions do not simply reflect temporary, ad hoc categories, but more permanent metaphorical categorisations of experience.

Again, I would argue that the off-line nature of this study means that the findings tell

us little about the on-line processing of idiomatic expressions. Moreover, the findings cannot be generalized to metaphors, which are the focus of investigation in this thesis, as the materials used in the studies discussed above, are all highly idiomatic, and it is generally accepted that idiomatic expressions require a different explanation from novel (e.g. The politician's speech was noxious) and even familiar (e.g. My job is a jail) metaphoric statements

Evidence against the Direct Access account

Is there any evidence to suggest that the Direct Access account may not accurately capture the comprehension process underlying metaphor comprehension?

Camac and Glucksberg's (1984) data support the class-inclusion account of metaphor processing, and provide evidence against the Direct Access view, which claims that the majority of metaphors are based on pre-existing metaphoric mappings in long-term memory. According to the Direct Access account, topic and vehicle concepts are associated in long-term memory (see section 1.6.5), which suggests that such topic and vehicle terms would have a priming effect on each other. Contrary to this prediction, findings from Camac and Glucksberg's lexical decision task revealed that topic and vehicle pairs (e.g. *surgeons-butchers; schools-zoos; words-daggers*) drawn from good and interpretable metaphors are not associatively related to one another; lexical decisions on vehicle terms were not facilitated by being presented together with their respective topic term as one would expect if the two words were associatively related (due to known priming effects from associates). It is hard to see how the Direct Access account could explain this finding given the fact that its central claim is that the metaphoric mappings necessary for understanding the vast majority of metaphors are already instantiated in long-term memory.

Support for the Graded Salience Hypothesis

Is there any evidence to suggest that metaphor interpretation is guided by salience? Is there any evidence to suggest that both metaphoric and literal interpretations are immediately available when processing a familiar metaphor in a metaphoric context or literal context, or that only a literal interpretation is immediately available when processing a novel metaphor in a metaphoric context? Moreover, is there any evidence to suggest that in a literal context, a metaphoric interpretation of

a familiar metaphor is discarded, whereas in a metaphoric context, a literal interpretation remains active?

A number of papers present findings in support of the priority of salient meanings (see, Giora, Fein and Schwartz 1997; Giora and Fein 1999a among others) .

Firstly, Giora, Fein and Schwartz (1997) found equal reading times for metaphoric target sentences in both literally and metaphorically biasing contexts, which supports the Graded Salience Hypothesis' claim that the most salient interpretation will be accessed first, regardless of whether it is 'literal' or 'non-literal'. However, I would argue that these findings do not only support the Graded Salience Hypothesis, they provide evidence in support of any of the current accounts discussed in this thesis; all of which posit some sort of parallel processing model in which there is no default literal interpretation.

Secondly, Giora and Fein (1999) argue that they found evidence in support of the Graded Salience Hypothesis' claim that salient metaphoric and literal meanings are activated in both types of context. The authors present findings from 'fragmented word completion tasks' in which after reading a series of target sentences in literal and metaphoric and literal biasing contexts (3) and (4), the participants were required to complete two fragmented words with 'the first words that come to mind'. One of the fragmented words was related to the literal meaning (e.g. *rise*), and one was related to the metaphoric meaning (e.g. *act)*.

(3) The Saturday night party went on for hours. Drinks were poured, and we danced all night. We were probably less than considerate when, the next evening, we called on our friends who had been partying with us. When they opened the door we realised: only now did they wake up.

(2) A bloody war has been going on in central Europe for a few years. Thousands of innocent women, men and children got massacred, and no one budged or lifted a finger. At last a decision was made to intervene in the fights: only now did they wake up.

Participants' responses were rated as either related or unrelated to the metaphoric and literal interpretation of the target sentence. Firstly, the results illustrate that in both a metaphoric and a literal context, words associated with the literal and the metaphoric interpretation are produced (both contextually compatible and incompatible words). Secondly, in a metaphoric context, participants produced an equal amount of compatible (with a metaphoric interpretation) and incompatible (with a literal interpretation), whereas in a literal context participant produced far more compatible words than incompatible words.

The authors argue that this finding suggests that in the contexts biasing the metaphoric meaning as well as in the contexts biasing the literal meaning, contextually inappropriate yet compatible meanings are retained even after a long delay. In contrast, they argue that their findings suggest that meanings conflicting with the compatible meaning (i.e. metaphoric meanings in a literal context) are discarded, and thus lose activation, exactly as predicted by the Graded Salience Hypothesis.

Though interesting in its own right, I would argue that this finding tells us little with respect to the on-line processing of metaphors. Participants were asked to make an 'after the fact' judgment, which does not necessarily reflect the on-line processing that has just taken place.

Although Giora and colleagues' findings are insightful with respect to metaphor processing in general, it is not clear that they a) support the Graded Salience Hypothesis over other accounts, and b) provide robust evidence of the on-line processes that underlie metaphor comprehension.

In the next section, with the current theoretical accounts and their processing predictions in mind, I will critically discuss empirical evidence that sheds light on the activation levels of contextually relevant and irrelevant information during metaphor processing, as well as which cognitive mechanisms might be involved in regulating these activation levels.

2.1.4 POTENTIAL EVIDENCE OF SUPPRESSION DURING METAPHOR COMPREHENSION

Do the activation levels of relevant and irrelevant properties associated with the lexically encoded vehicle concepts differ after arriving at a metaphoric interpretation, as many of the accounts suggest? Does the deactivation of irrelevant information result from passive decay (due to lack of attention), or are these properties/features actively suppressed in order to avoid interference?

The Relevance Theoretic account, the class-inclusion account, and the Structure mapping account (see section 1.6 for full discussion), all entail that metaphor inconsistent features are not attended to during the construction of a metaphoric interpretation. Therefore, according to these accounts activation levels of metaphor inconsistent features of the vehicle should be significantly lower in a metaphor biasing context, than in a literal or neutral biasing context. These accounts do not make specific predictions about whether the deactivation of metaphor inconsistent features would result from 'passive decay' or 'active suppression'. However, a number of empirical studies claim to have found evidence of suppression taking place during novel metaphor comprehension (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Peirce, Maclaren and Chiappe 2010).

Some studies have shown that activation levels of metaphor irrelevant information associated with the encoded meaning are significantly reduced after having arrived at a metaphoric interpretation. Such findings have generally been interpreted as evidence of active suppression of irrelevant information taking place during metaphor comprehension. However, I will argue that these findings are not as clear-cut as many of the authors claim. It is not clear that any of the findings I will discuss, provide decisive evidence of active suppression. Instead, it is likely that they provide evidence of deactivation, but not of the exact cause of that deactivation.

Other studies have found indirect evidence of suppression by showing that cognitive mechanisms known to be responsible for suppression and activation regulation are employed during metaphor comprehension. I will also review these findings, and

discuss their scope with respect to what they can tell us about suppression during metaphor comprehension.

Before discussing these experiments, I will briefly introduce the notions of 'passive decay' and 'active suppression'.

Active suppression vs. passive decay

In the context of language processing, suppression is understood as an active reduction of activation of a given representation, which is in contrast with a representation automatically decaying. Gernsbacher and Faust (1991), Gernsbacher and St John (2002) posit a 'general mechanism of suppression' within their 'structure building framework'. They argue that incoming information consistent with already represented information would be mapped onto the structure under construction. However, incoming information that is inconsistent, irrelevant, or confusing would be actively suppressed.

In contrast, according to early models of cognition (e.g. Anderson 1983) un-stimulated mental representations are left to automatically decay. For example, the activation level of the contextually inappropriate meaning of a polysemous word or the literal meaning of a metaphor vehicle, in a metaphor biasing context would automatically decay, because it would not be stimulated by the context. However, as discussed above, many current accounts of metaphor processing propose that irrelevant meanings, or at least features associated with irrelevant meanings are actively suppressed.

Both the passive decay and the active suppression hypotheses predict that the activation of irrelevant meanings in a metaphoric context will decrease after a certain delay. However, in a neutral context, the two hypotheses make differing predictions. According to the decay hypothesis, both meanings would lack stimulation, and thus, both would decay. On the other hand, the suppression hypothesis would predict that, after a delay, both meanings would remain as activated as they were initially, as the context offers no trigger for suppression (Gernsbacher and Faust 1991).

Gernsbacher and Faust's (1991) data support the suppression hypothesis; both meanings of ambiguities were equally activated after a delay, suggesting that based on

biasing contextual information, irrelevant meanings are actively suppressed during the resolution of ambiguities. It would therefore follow, that the same is true of irrelevant meanings in a figurative biasing context, during the processing of a figurative statement. Indeed, many findings (which I discuss in some detail below), suggest that active suppression does take place during the processing of novel metaphors.

Evidence from on-line studies

All the current accounts discussed, with the exception of the Graded Salience Hypothesis are supported by various on-line findings that indicate that deactivation of lexically encoded, metaphor irrelevant meanings takes place, and tentatively suggest that this deactivation is the result of suppression (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Peirce, Maclaren and Chiappe 2010).

Priming effects are generally taken as a measure of word activation (Meyer & Schvaneveldt 1971). Such facilitation effects are usually interpreted as the result of a spreading activation process, according to which, when processing a word such as 'tea', activation spreads to conceptually associated words like 'coffee', speeding up their identification (Meyer & Schvaneveldt 1973). This assumption is the basis for most studies investigating context effects on lexical processing.

Gernsbacher, Keysar, Robertson and Werner (2001)[21] claim that their sentence verification findings indicate that suppression takes place during metaphor comprehension. After reading a prime sentence, a metaphor (e.g. "*that defense lawyer is a shark*"), a literal statement (e.g. *"that hammerhead is a shark*"), a nonsensical statement (e.g. "*his English notebook is a shark*") or an unrelated statement (e.g. *"that new student is a clown*"), participants were asked to verify a property statement. Verification latencies for property statements relevant to the metaphoric meaning of the vehicle (e.g. "*Sharks are tenacious*") were faster after participants read the metaphor prime sentence (e.g. *"that defense lawyer is a shark*") than after they read the literal or nonsensical prime sentence (e.g. "*that hammerhead is a shark" or "his English notebook is a shark*"). In contrast, verification latencies for property

[21] Glucksberg, Newsome and Goldvarg (2001) replicated this study, with similar findings, but their study faces the same criticism as that discussed above in relation to Gernsbacher et al.'s (2001) findings (see Rubio-Fernandez (2004) for further discussion)

statements relevant to the literal meaning of the vehicle (e.g. "*sharks are good swimmers*") were slower following the metaphor prime versus the literal or nonsensical prime sentences.

The authors concluded that metaphor interpretation involves enhancing attributes that are relevant to the metaphorical interpretation of the vehicle while suppressing those that are irrelevant, as is proposed in all the accounts discussed above (Carston 2002, Wilson and Carston 2007, Recanati 2004, Clement & Gentner, 1991).

However, Rubio-Fernandez (2004) points out that Gernsbacher et al.'s (2001) experimental design is not without problems; the literal and nonsensical control sentences used, end in the same word as the corresponding metaphorical statement, meaning that the control sentences were not properly unrelated to the target sentences. The control sentences will have been facilitated/primed by the target sentences. Rubio-Fernandez emphasizes that this would have led to the activation level of the target properties (TENACIOUS/SWIMS), after reading a control sentence, being above zero (the target properties TENACIOUS/SWIMS would have been primed by the presence of the metaphor vehicle 'shark'). Therefore, the control conditions in this study do not provide a true baseline, which is essential in a study of this kind.

The same criticism can also be directed at the Gernsbacher, Keysar and Robertson (1995), and Glucksberg, Newsome and Goldvarg (1997), which used the same type of related controls as in the first two experiments in Gernsbacher et al. (2001).

Gernsbacher et al. (2001), aware of the limitations of their studies that lacked an unrelated control condition, report a final experiment which did in fact use properly unrelated controls. However, as Rubio-Fernandez (2004) observes, the findings from this third experiment did not replicate the findings from their first two experiments. Instead, they found that participants were faster to verify a metaphor irrelevant statement after reading a metaphor, than after reading a control. Gernsbacher et al. (2001) appeal to a 'repetition effect' to explain these findings. The design of the final experiment was such that in the critical sentence pairs, the metaphor vehicle was repeated (e.g. *"My defense lawyer is a shark"* and *"Sharks are good swimmers*"), but this was not the case in the control conditions (e.g. *"The new student was a clown"*) and (e.g. *"Sharks are good swimmers*"). The authors' argue that the appearance of the

same word shortly before, could have had a priming effect on participants' verification latencies in the metaphor conditions. In light of this, Gernsbacher and colleagues calculated z-scores[22] for the verification latencies, which back in line with their earlier findings, illustrated a suppression effect.

Yet, as Rubio-Fernandez (2004) points out, although a priming effect was most likely present due to the repetition in their design, it is not clear whether, without the facilitation, the activation levels of the metaphor irrelevant statements would have been below baseline. As a result of this, Gernsbacher et al.'s (2001) findings are inconclusive.

McGlone and Manfredi (2001) also argue that their findings provide evidence of suppression during metaphor processing. They found that metaphor (e.g. *"Some lawyers are sharks")* comprehension was facilitated by prior exposure to a) the topic or vehicle concept, presented on its own (e.g. "*Some Lawyers are ****"* or "*Some **** are sharks"*), b) a sentence ascribing a metaphor-relevant property to either the topic or the vehicle (e.g. *"Lawyers can be ruthless"* or "*Sharks can be ruthless*"), or c) a sentence ascribing a metaphor-irrelevant property to the topic (e.g. "*Lawyers can be married*"). However, comprehension of the metaphor was not facilitated by prior exposure to a sentence ascribing a metaphor-irrelevant property to the vehicle (e.g "*Sharks can be blue*"). The authors argue that the failure of these sentences (but not the equivalent sentences ascribing a metaphor-irrelevant property to the topic) to facilitate metaphor comprehension is due to their priming an inconsistent 'literal' interpretation of the vehicle, which is suppressed during the interpretation process.

Unlike the studies discussed above (Gernsbacher et al. 2005, 2001; Glucksberg et al. 1997), as well as the conditions already mentioned, this design did also incorporate a true baseline condition, in which the prime was just the framework of the metaphoric sentence, without the topic or the vehicle term (e.g. *Some **** are *****). However, because of comparisons with this baseline condition, it is not clear that the authors can legitimately conclude that their data provide evidence of suppression taking place during metaphor comprehension. With respect to novel metaphors (the metaphor condition was divided into two sub-conditions; novel and conventional), primes that

[22] A z-score quantifies the original score in terms of the number of standard deviations that that score is from the mean of the distribution.

were sentences ascribing a metaphor-irrelevant property to the vehicle produced verification latencies that were on average, equal to the baseline condition. Primes that were sentences ascribing a metaphor-irrelevant property to the vehicle only produced verification latencies that were below baseline (on average) in the conventional metaphor condition. It could be argued that these findings are indicative of a lack of facilitation or a dampening of priming, but not necessarily of suppression, as suppression should operate below baseline.

As Rubio-Fernandez (2006) suggests, it could be argued that if facilitation is understood as a positive activation, suppression should be understood as a negative activation. This assumption is indeed supported by empirical evidence suggesting this pattern (e.g. Neurmann & Deschepper 1992; Neurmann, Cherau, Hood & Steinnagel 1993). However, whereas facilitation with respect to the baseline level of unrelated words is usually taken as indicative of activation, it is not always the case that a below baseline effect is required in order for data to be considered indicative of suppression. For example, it is claimed that contextually irrelevant meanings of a homonym are suppressed, even though reaction times to associates of that meaning are similar to rather than slower than reaction times to unrelated controls (e.g. Swinney 1979; Seidenberg, Tanenhaus, Leiman & Bienkowski 1982; Tanenhaus et al. 1979). Therefore, McGlone and Manfredi are not alone in concluding that suppression has taken place on the basis of an 'equal to baseline' effect.

Although McGlone and Manfredi's (2001) data suggest that suppression takes place during the comprehension of conventional metaphors, without a below baseline suppression effect in the novel metaphor condition, these findings are perhaps more tentative with respect to suppression taking place during novel metaphor comprehension. Furthermore, there is a general consensus among many current theorists that conventionalized metaphors are processed differently to novel metaphors (Bowdle and Gentner 2005; Wilson and Carston 2007; Giora 2002; Glucksberg 2001). Thus, findings with respect to conventionalized metaphors cannot be generalized to novel metaphors.

Rubio-Fernandez (2004, 2007) moved beyond sentence verification, and used a cross-modal priming paradigm which made it possible to get an on-line measure of property

activation across time, and to determine at which point in processing, there is a loss of activation of irrelevant literal properties of the metaphor vehicle.

Her cross-modal lexical priming studies were adapted from Swinney's (1979), in which he found that the irrelevant meanings of homonyms were suppressed as early as 200-300ms from the offset of the ambiguous words. Rubio-Fernandez (2004, 2007) however, found that in metaphor conditions (e.g. *"John doesn't like physical contact. Even his girlfriend finds it difficult to come close to him. John is a cactus*"), there was loss of activation of superordinates (e.g. "*plant"*) between 400ms and 1000ms, which, she argues, is the result of active suppression of metaphor irrelevant properties.

In contrast, she found that in neutral baseline contexts (e.g. *"Mary bought her mother a cactus"*), superordinates remained active up to 1000 ms, where no property of that prime was particularly relevant or irrelevant for interpretation (Rubio-Fernandez 2004, 2007). Rubio-Fernandez argues that the loss of activation of superordinates in metaphoric contexts could not, therefore, have been the result of passive decay (which would have taken place in the neutral contexts) but has to be due to active suppression[23].

Rubio-Fernandez argues that active suppression is required during metaphor comprehension because metaphor irrelevant features of the encoded vehicle concept are frequently not just irrelevant but also inconsistent and in direct conflict with the metaphoric meaning. She also argues that the difference in time course of suppression of irrelevant properties or meanings in disambiguation and metaphor interpretation (evident in the difference between Swinney, 1979, and Rubio-Fernandez', 2004; 2007, findings) is due to the different suppression processes involved. She argues that the pragmatic processes involved in novel metaphor interpretation involve some level of awareness and need time to develop; whereas those involved in disambiguation do not require this level of attention and awareness. Therefore suppression operates faster in disambiguation than in metaphor interpretation.

However, the nature of the neutral baseline condition in Rubio's study means that there is potentially an alternative interpretation of the data. It could be argued that the

[23] Rubio-Fernandez follows the distinction made by Gernsbacher and colleagues (Gernsbacher & Faust 1991; Gernsbacher & St. John 2002) between passive decay and active suppression; "suppression is understood as 'a directed reduction in activation', which is different from the outcome of other inhibitory mechanisms such as decay or compensatory inhibition" (Rubio-Fernandez 2004:114)

neutral contexts (e.g. *Mary bought her mother a cactus*) were not completely neutral. It is quite possible that superordinates (e.g. *plant*) were relevant to interpretation, and were, therefore, primed in the neutral condition, causing them to remain activated up to 1000ms. On this basis, we cannot be sure that the neutral condition provided a true baseline (in which superordinates were definitely not primed) from which to compare the activation patterns in the metaphor condition. True neutrality could only have been achieved by a series of Xs (e.g. XXXX XXX XXXXX XXXX cactus), or something of that kind.

Inconclusive findings?

These studies indicate that figurative language affects priming. Each study illustrates that priming affects are dampened by the derivation of an alternative, metaphoric interpretation of that term. However, it could be argued, contrary to the authors claims, that none of these findings provide conclusive evidence that active suppression takes place, as it is not possible to determine whether deactivation (dampening of priming) occurs as a result of lack of attention or active suppression. It could be argued that evidence of active suppression must come in the form of a below baseline effect, in which activation levels of literal meanings in metaphor biasing contexts are found to be lower than in completely neutral contexts (i.e. a series of Xs).

Rubio-Fernandez (2006), on the other hand, argues that in typical communication, suppression does not operate below-baseline at the lexical level. On the basis of her cross-modal lexical priming findings, she argues, that the distinction between passive decay and active suppression is not reflected in the degree to which activation is decreased (at or below baseline), but the speed at which activation reduction takes hold.

Rubio-Fernandez found that central properties (e.g. BUBBLE) of primes (e.g. 'champagne') were initially activated when processing the prime words, both in neutral contexts (e.g. "*For the dinner, Mary brought champagne*") and cancelling contexts (e.g. "*Even though the bottle had been opened for a week, John finished off the champagne*"). However, whereas in neutral contexts, central properties remained active at an intermediate delay (400ms), in the cancelling contexts, the activation of central properties had dropped to baseline level by 400ms. Rubio-Fernandez argues that given the central properties remained active at 400ms in neutral contexts, in

which they are not particularly relevant to interpretation, it is reasonable to conclude that the loss of activation in the cancelling contexts is the result of active suppression, but that the mechanism of suppression must not operate below baseline, as even at 1000ms, activation level was not below baseline in cancelling contexts.

Given the potential criticism of Rubio-Fernandez' baseline condition I presented above, I am not sure that the findings on which this argument is founded are robust enough to backup Rubio-Fernandez' claim, however, the argument is highly plausible, and there is no evidence to suggest that in typical communication, suppression operates below baseline.

Correlation between executive function and metaphor comprehension

If suppression takes place during metaphor comprehension then we might expect to find evidence of the cognitive mechanisms responsible for suppression being employed during the processing of metaphors. Is there any such evidence?

'Executive functions' is an umbrella category which denotes those processes that serve to *"monitor and control thought and action, including self-regulation, planning, behavior organization, cognitive flexibility, error detection and correction, response inhibition, and resistance to interference*" (Carlson and Moses 2001: 1; see also, Eslinger 1996; Zelazo, Carter, Reznick, & Frye, 1997). This section is dedicated to the discussion of evidence that suggests that at least sub-processes (i.e. inhibitory control and working memory) within our general 'executive functions' are employed during metaphor comprehension in order to suppress the activation of metaphor irrelevant information associated with the encoded meaning.

Inhibitory control and working memory are sub-processes of our executive functions. Inhibition control is the ability to maintain attention on responses/representations/information in order to achieve a given goal, while inhibiting responses/representations/information that may interfere with achieving said goal, and working memory is the system that keeps representations active for use in verbal and nonverbal tasks, such as reasoning and comprehension, and makes them

available for further information-processing. Both inhibitory control and working memory are basic executive functions that make it possible for more complex executive functions like problem-solving to develop (Senn, Espy and Kaufmann 2004), and are among the earliest executive functions to appear, with initial signs observed in infants 7 to 12-months old (Luca, Cinzia, Leventer, Richard 2008; Anderson 2002)

Empirical findings suggest that inhibitory control and working memory are important components during metaphor comprehension (Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold, Faust and Goldstein 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007). Indeed, metaphor relevant information must be attended to, while ensuring that information that is irrelevant to, or inconsistent with, a metaphoric interpretation does not interfere with processing.

Some of the studies discussed below have attempted to provide evidence of suppression taking place during metaphor comprehension, by observing a correlation between executive function capacities and metaphor comprehension capacity. However, although all the findings below suggest that attention mechanisms are employed during metaphor comprehension, we cannot conclude from them that active suppression takes place during interpretation.

Peirce, Maclaren and Chiappe (2010) found that individuals with higher-working memory span exhibited less of a MIE (see Glucksberg, Gildea and Bookin (1982), section 2.1.1) than those with low-working memory span. Indeed, high-WM individuals were able to arrive at a metaphoric interpretation faster than low-WM individuals, and thus they were also able to judge that metaphoric interpretation to be literally false more quickly. This finding suggests that working memory span effects metaphor comprehension.

High working memory span is indicative of good executive functioning. The executive component of Working Memory is involved in ensuring that behavior is guided by goal-relevant information and in reducing the effect of irrelevant responses (Kane, Bleckley, Conway, & Engle, 2001). For example, Kane and Engle (2003) found that high-WM individuals were less distracted by word names in the Stroop

task (Stroop 1935; see section for description of the task). Similarly, in the Metaphor Interference Effect task, people must resolve the conflict in truth-value arising from automatically apprehending metaphorical meanings. Success requires them to manage the interference produced by "true" metaphorical meanings when responding that the statement is literally false (Glucksberg et al. 1982. See page 92 for a full description of the task).

Pierce et al.'s (2010) findings indicate that executive functions are employed during metaphor comprehension. This shows that regulatory capacities responsible for controlling activation levels are utilized when arriving at a metaphoric interpretation, yet these findings do not themselves indicate that active suppression takes place in such instances.

Based on their ERP findings, Gold, Faust and Goldstein (2010) conclude that inhibition (suppression) is a component of metaphor comprehension. They recorded ERPs from individuals with an Autistic Spectrum Disorder (ASD) and neuro-typical individuals while they read novel metaphoric statements. They found that the ASD group was slower to process metaphors than the neuro-typicals. In contrast, N400 latency recordings revealed no difference between the two groups when reading novel metaphors (i.e. N400s occurred at around 200ms for both groups in the metaphor condition). The disparity between the reaction time data (which reveal a difference between the two groups) and the N400 latency data (which reveals no difference between the two groups) suggests that the stages following semantic integration may be slower for individuals with an ASD than for neuro-typical individuals. So why do individuals with an ASD have difficulty with semantic integration?

According to Jung-Beeman (2005), following semantic integration, a 'semantic selection' stage occurs, in which competing activated concepts are sorted out, and one concept is selected (i.e. an appropriate concept remains active, while inappropriate concepts are suppressed/inhibited); thus our inhibitory control capacities must be responsible for this process of semantic selection/integration. Moreover, studies suggest that inhibition/suppression relies on inferior frontal brain mechanisms (e.g., Barch et al., 2000), which are known to play a role in executive processes, too (Bookheimer 2002), and have been found to be deficient in individuals with an ASD

(e.g. Kleinhans, Akshoomoff and Delis 2005; Rinehart et al. 2006). This could explain why the ASD group show signs of difficulty with the meaning selection process.

In summary, Gold and colleagues' findings suggest that selection of an appropriate meaning takes place during metaphor comprehension, and thus inappropriate meanings must be deselected/inhibited, which is why ASD individuals, in whom the cognitive mechanisms required for inhibition are deficient, are slower to read metaphors than neuro-typical individuals.

In addition, Monetta and Pell (2007) found that participants with Parkinsons disease who were identified as having impaired working memory (one of the 'executive functions'), have serious difficulty with metaphor comprehension. These findings again suggest that working memory capacities (of which inhibition control is a key component) are employed during metaphor comprehension.

Similarly, Papagno, Lucchelli, Muggia, and Rizzo's (2003) study also provided support for the idea that active suppression is required in order to derive non-literal interpretations. They tested patients with a diagnosis of mild Alzheimer's on their ability to correctly interpret idioms. Patients with Alzheimer's disease have been found to have impaired executive functioning, leading Papagno et al. to hypothesise this would affect their ability to comprehend idioms, which requires the literal meaning to be suppressed first. Patients were tested using a sentence-to-picture naming task. They had to choose which of two pictures best matched a given sentence. In the first experiment one picture represented the figurative interpretation and the other the literal interpretation. In the second experiment one picture represented the figurative interpretation and the other was unrelated. Patients chose the literal interpretation when it was plausible, but chose the idiomatic interpretation if the alternative choice was completely unrelated to the idiomatic interpretation. These results are particularly interesting because they show that the Alzheimer's patients could comprehend the idiomatic interpretation as long as there was not some highly activated, idiomatic inconsistent, literal interpretation interfering. The results indicate that the literal interpretation of an idiomatic utterance is activated, as well, and must be suppressed in order to arrive at the idiomatic interpretation.

Finally, Amanzio, Geminiani, Leotta, Cappaalso (2007) found a correlation between performance on executive function tasks and the ability to comprehend novel metaphors in Alzheimer's patients. Again, suggesting that executive functions are employed during metaphor comprehension as suppression is a component of metaphor processing.

Taken together, the evidence discussed in this section strongly suggests that our executive functions are active during metaphor processing in order to regulate the activation levels of relevant and irrelevant information associated with the linguistically encoded content. However, the question remains as to whether the evident deactivation of metaphor irrelevant information is the result of active suppression, or passive decay. If it is correct to assume that suppression should bring activation levels down to below base-line, then until we find evidence of such a below baseline effect, we cannot conclude that the observed deactivation patterns are the result of suppression. If however, Rubio-Fernandez' arguments are accurate, and the distinction between passive decay and active suppression is not reflected in the degree to which activation is decreased (at or below baseline), but the speed at which activation reduction takes hold, then we can look at the findings presented in this section as evidence of suppression effects during metaphor processing.

Our word naming experiments reported in Chapter 3 were designed to further investigate activation levels of relevant and irrelevant information during novel metaphor (and hyperbole) comprehension, and the developmental experiments reported in chapter 4 investigate a potential correlation between the development of executive function capacities and metaphor and hyperbole comprehension in young children.

2.2 ADULT HYPERBOLE FINDINGS

The above discussion of empirical findings relating to metaphor comprehension illustrates how numerous and diverse the research studies are investigating metaphor processing. However, there is little, if any, research investigating the on-line processing of hyperbole, and to my knowledge, there is no published research comparing the processing of metaphor and hyperbole.

The unified accounts of figurative language, as well as those that suggest or entail that metaphoric and hyperbolic statements are processed in the same way, provide motivation for contrasting the processing of the two tropes. Moreover, Rubio-Fernandez' (2004; 2007) arguments could be suggestive of processing differences between metaphor and hyperbole.

Rubio-Fernandez claims that metaphor comprehension does involve active suppression due to metaphor irrelevant features frequently being not just irrelevant but also inconsistent with the intended metaphoric meaning. For example, many features associated with the encoded concept DALMATIAN (i.e. features associated with the superordinate DOG) will not just be irrelevant but also in direct conflict with a metaphoric interpretation of the utterance "*you are a Dalmatian"* when said of someone covered in spots of milkshake after a blender has exploded. If this claim is correct then it raises the question of whether active suppression is required in the processing of other tropes such as hyperbole, where irrelevant features may not actually be inconsistent.

It is possible that hyperbole irrelevant features are frequently irrelevant, but not also inconsistent (in direct conflict) with the intended hyperbolic interpretation. For example, many features associated with the encoded concept NOXIOUS will be irrelevant to the hyperbolic interpretation of " *the earl grey tea was noxious"* (i.e. features associated with the superordinate HARMFUL, TOXIC AND POISONOUS THINGS), but they are not necessarily inconsistent or in direct conflict with a hyperbolic interpretation. This being the case, active suppression may not be required in order to arrive at a hyperbolic interpretation.

If hyperbole does not require active suppression as metaphor does then we may find that metaphors take longer to read than hyperboles, or that word naming latencies are longer following metaphoric statements than following hyperbolic statements.

As already mentioned, recent on-line empirical research has focused almost exclusively on metaphor despite the new unified accounts of figurative language discussed above, coming to the forefront of theoretical discussion. Therefore, there are no previous studies that can test the unified accounts and shed light on the above prediction. This is a gap that I intend to fill when I present findings (see Chapters 3 and 4) from several studies in which metaphor and hyperbole are directly contrasted

using a number of different paradigms (reading-time; word naming; eye-tracking; developmental). Firstly, though, I will discuss some of the few existing studies for which hyperbole was the focus of investigation.

Colston and Keller (1998) carried out one of very few psycholinguistic studies investigating the processing of hyperbole. They investigated hyperbole as a tool for expressing surprise using an opinion task, in which participants read a series of scenarios and marked on a rating scale the degree to which they thought the speakers expected the situations in which they found themselves. They found that hyperbolic expressions conveyed a sense of surprise in the speaker, more than an equivalent literal statement. Furthermore, when hyperbole was combined with irony, an even greater degree of surprise was expressed. Interestingly, they found that no greater degree of surprise was communicated by the use of 'outlandish', totally unrealistic hyperbole, than was conveyed by the use of 'very slight, realistically possible hyperbole'. These findings suggest that hyperbolic utterances are a pragmatic phenomenon which serve to implicitly convey a sense of surprise.

Hyperbole and hyperbolic irony have received some attention from discourse analysts and corpus linguists. Kreuz and Roberts (1995) discuss hyperbole as a cue for ironicity, while Mora (2003) and Carter and McCarthy (2004) explore ways in which hyperbole is used during communication, by analyzing instances of hyperbole in naturally-occurring conversations in large corpora (e.g. the British National Corpus). Based on analysis using a conversation and discourse analysis framework, Mora concludes that contrary to current empirical approaches, hyperboles should be viewed 'interactively', by including listeners' responses and subsequent contributions within one hyperbolic item. She argues that hyperboles should not be studied as 'single, creative acts by the speaker alone'. In addition, she argues that hyperboles may be so prevalent in everyday conversation because they 'might be classified as '*low-risk' figures*', since the chances of misunderstanding are low.

Likewise, Carter and McCarthy (2004) argue that *"an interactive approach to hyperbole is indispensible"* as the 'listener reaction' is essential to its interpretation and the success of hyperbolic communication depends on the listener *"entering a pact*

of acceptance of extreme formulations, the creation of impossible worlds, and/or apparent counterfactuality."

Colston and O'Brien (2000) were concerned with the pragmatic roles played by tropes such as irony and hyperbole. They found that tropes that present 'contrasts of kind' (e.g. irony and metaphor) perform certain pragmatic functions (i.e. condemnation, humor, and speaker protection) to a greater extent than tropes that 'present contrasts of magnitude' (e.g. hyperbole).

Although these studies provide insights regarding the pragmatic function of hyperbole, there is, as yet, no study investigating the on-line processing of hyperbole, the findings of which might indicate the nature of processes and mechanisms underlying the comprehension of hyperbolic statements. In Chapter 3, I will report findings from on-line studies, which aimed to do precisely that.

2.3 SUMMARY AND DISCUSSION OF EMPIRICAL EVIDENCE

Together, the empirical findings discussed in this chapter reveal an interesting picture of metaphor processing. It appears that literal meanings are not default, and metaphoric interpretations are available from the beginning of processing. Familiar metaphors are quicker and easier to process than unfamiliar metaphors. Metaphor irrelevant information associated with the linguistically encoded content appears to lose activation after a metaphoric interpretation has been derived, possibly as a result of active suppression. Furthermore, while there are empirical data presented in support of all of the current accounts of metaphor discussed in this thesis, perhaps the most robust findings support the concept construction accounts in which all but the most conventionalized metaphors are interpreted as category assertions, with the category being constructed on the basis of the context and the encoded content.

Against a sequential processing account of metaphor processing

There is a substantial body of evidence against a sequential model of metaphor processing (Ortony et al. 1978; Inhoff et al. 1984; Glucksberg et al. 1982; Keysar 1989; McElree and Griffith 1995; and McElree and Nordlie 1999). In light of the contradictory reading-time findings (Gold et al. 2010; Lemaire and Bianco 2003; Gibbs 1990; Noveck et al. 2001; Janus and Bever 1985), it is perhaps the findings from alternative paradigms which most strongly support a parallel processing model, and therefore, the current accounts which are not based on the 'literal first' assumption.

Suppression during metaphor comprehension

Although there is some evidence of suppression taking place during novel metaphor comprehension (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Gold, Faust and Goldstein 2010; Papagno et al. 2003; Peirce, Maclaren and Chiappe 2010), this would be consistent with all the accounts discussed here, except for the Graded Salience Hypothesis. The findings from studies which directly assess activation levels of metaphor relevant and metaphor irrelevant properties of the vehicle concept during novel metaphor comprehension, are not always clear-cut or particularly convincing. It is unclear whether an 'equal to baseline' effect on metaphor processing conditions is indicative of active suppression taking place during metaphor comprehension.

Our word naming experiments, which are reported in Chapter 3, were designed to further investigate activation levels of literal meanings immediately after deriving a non-literal interpretation.

Familiarity effects

There is strong evidence of familiarity effects during metaphor comprehension, which is consistent with all of the accounts discussed (Blank, 1988; Blasko & Connine, 1993; Camac & Glucksberg, 1984; Gildea & Glucksberg, 1983; Glucksberg, Gildea, & Bookin, 1982; Martin, 1992; Grauwe; Swain, Holcomb and Kuperberg 2010).

Structure-Mapping account

Gentner and colleagues present a wealth of empirical data, which they interpret as support for their Structure Mapping account over categorization accounts (Zharikov and Gentner 2002; Wolff and Gentner 2000; Wolff and Gentner 2011; Gentner and Wolff 1997; Onishi and Murphy 1993; Gentner and Bowdle 2008; Coulson and Van Petten 2002; Onishi and Murphy 1993). However, I argue, that it is not clear that many of these findings do in fact go against the concept construction accounts which propose that metaphors are processed as categorizations, as a) neither rule out an early alignment process per se (Glucksberg even explicitly states that processing likely begins with such a comparison process), b) the Relevance Theoretic account is even consistent with a neutral early alignment process, and c) we cannot be certain whether Wolff and Gentner's (2011) findings are evidence of a neutral alignment process intrinsic to metaphor processing or intrinsic to the experimental task.

Furthermore, findings suggesting that familiar metaphors are processed as categorizations (Gentner and Bowdle 2008), do not go against concept construction accounts, and finally, evidence of facilitation resulting from the close proximity of the topic and vehicle concepts (Onishi and Murphy 1993) can surely be explained by any of the accounts by appealing to memory load and recall demands.

Concept construction accounts

Much of the evidence (Glucksberg, McGlone and Manfredi 1997; Glucksberg and Haught 2006; Jones and Estes 2006) presented as support for the concept construction accounts over the Structure Mapping account (i.e. the irreversibility of metaphors; novel metaphors not privileging simile form over categorization form) seems robust, and the onus does appear to be on Gentner and colleagues to reconcile their account with these data.

To date, there have been few studies that have aimed to empirically test the claims of the relevance theory, unified account of broadening. To my knowledge, Rubio-Fernandez's (2004; 2007) lexical priming studies are the only such studies, and as discussed, her property activation findings tentatively support all those accounts that posit suppression as a component of metaphor comprehension (See section 2.4 for discussion). Therefore, there is a lack of empirical evidence that might allow us to

determine which of the two concept construction accounts is most adequate (i.e. whether it is the recognition of a vehicle's dual reference or the presumption of optimal relevance which initiates the ad hoc concept construction process).

The Direct Access account

Although some evidence (Nayak and Gibbs 1990) suggests metaphor comprehension is facilitated by pre-existing mappings between domains - triggered by a preceding metaphor pertaining to the same conceptual mapping, it is not apparent that this evidence goes against the accounts other than the Direct Access view. It does not constitute evidence of pre-existing conceptual mappings. Instead it suggests that metaphor processing is less effortful when there is a preceding metaphor pertaining to the same mapping/relevant properties.

Nayak and Gibbs' evidence fits nicely with the Graded Salience Hypothesis, as the salience of the metaphoric meaning would be increased as a result of a preceding similar metaphor. Likewise, the Relevance Theoretic account entails that the discourse context primes relevant encyclopaedic properties of the lexically encoded vehicle concept and that these relevant properties/features therefore receive additional activation and are thus more accessible. Therefore, if a related metaphor is present in the immediately surrounding discourse, such facilitation would be predicted by Relevance Theorists (Wilson and Carston 2007; Sperber and Wilson 2006; Carston 2002). Furthermore, Gibbs (1992) himself acknowledges that the Class-inclusion model does suggest that permanently established conceptual structures are used to create ad hoc categories from which verbal metaphors arise, suggesting that they would predict facilitation from any metaphor which made these conceptual structures (and thus, the relevant ad hoc category) salient.

Moreover, Camac and Glucksberg's (1984) findings suggest that, in contrast to the Direct Access account's prediction, topic and vehicle pairs (with respect to their experimental items, at least) are not associatively related to one another.

Graded Salience Hypothesis

Giora and colleagues' findings in support of the Graded Salience Hypothesis (e.g. Giora and Fein 1999; Giora 2002), appear to conflict with Rubio-Fernandez' (2004; 2007) findings. While Giora and colleagues' findings suggest that metaphoric and

literal meanings are activated in both types of context, Rubio-Fernandez' findings indicate that there is loss of activation of superordinates (relating to the literal meaning only) between 400ms and 1000ms in metaphor conditions as a result of active suppression of metaphor irrelevant properties.

Giora and colleague's findings suggest that both the literal and metaphoric meanings are activated in both a literal and metaphoric context. While Rubio-Fernandez' findings, show initial activation of superordinates (relating to the literal meaning) in both contexts (which is consistent with all the accounts discussed in this thesis).

The cross-modal priming paradigm used in Rubio-Fernandez' studies is far more fine grained, and allows us to observe activation levels at specific delays during processing, and her results clearly indicate that in a metaphor biasing context superordinates lose activation between 400 and 1000 ms.

Empirical evidence relating to hyperbole processing

There is a distinct lack of on-line findings relating to the processing of hyperbole, and this gap in the research needs to be addressed.

2.4 SOME REMAINING RESEARCH QUESTIONS

Are metaphor irrelevant meanings actively suppressed during metaphor comprehension?

A number of studies suggest that active suppression of metaphor irrelevant properties/meanings takes place during metaphor comprehension. However, of those which directly assessed the activation levels of irrelevant information, few of the findings are free from alternative interpretations (see section 2.4). In order to confidently assert that metaphor interpretation requires the on-line suppression of metaphor irrelevant information, further evidence is required. By carrying out word naming experiments (the findings of which are discussed in Chapter 3) we aim to shed more light on how metaphor comprehension can affect the activation level of irrelevant information.

Can metaphor findings be generalized to hyperbole?

In addition, as already discussed, there is little, if any, research comparing metaphor and hyperbole, and the vast majority of research investigating figurative language comprehension has focused exclusively on metaphor, which means that any predictions the theories make with regard to the relationship between the two tropes are yet to be tested. This is not a trivial issue, as recent theoretical accounts have, in one way or another, shed metaphor of the sense of 'distinctness' (Sperber and Wilson 2006:172) that was long associated with it.

The original Relevance Theoretic concept construction account (Wilson and Carston 2007; Sperber and Wilson 2006; Carston 2002) conflates all instances of loose use (metaphor, hyperbole, approximation) into a single category of 'broadenings', while Gentner and colleagues (Clement and Gentner 1991; Bowdle and Gentner 2005) propose a single processing model for all comparisons; literal, metaphoric, and all those in-between. Moreover, Gibbs draws no distinction between tropes which are based on conceptual mappings (hyperbole and metaphor) when he proposes that mappings between domains are our tools for understanding the world. Finally, as discussed in section 1.7.2, I also speculate the class-inclusion account, as it is, would also have to account for hyperboles of the form X is Y.

Carston and Wearing's (2011) discontinuity account on the other hand, does posit a distinction between metaphoric and hyperbolic statements – while they retain the original Relevance Theoretic broadening account for hyperbole, they claim that metaphor interpretation on the other hand, always involves both broadening and narrowing.

Although all but Carston and Wearing's account do not necessarily predict processing differences between metaphor and hyperbole (see section 1.7.2), Rubio-Fernandez' findings discussed in section 2.4, could suggest otherwise. Rubio-Fernandez (2004; 2007) claims that metaphor comprehension does involve active suppression due to metaphor irrelevant features being frequently not just irrelevant but also inconsistent with the metaphoric meaning (see section 2.4). If this claim is correct then it raises the question of whether active suppression is required in the processing of other tropes such as hyperbole, where irrelevant features may not actually be inconsistent.

The five experiments presented in Chapters 3 and 4 were designed, for the most part, to address the broad questions above by attempting to answer the following more specific questions:

2 Are there processing differences between metaphors and hyperboles?
3 Does arriving at a metaphoric or hyperbolic interpretation of an utterance reduce the activation level of the lexically encoded content enough to dampen priming as has been found with respect to metaphor?
4 If there are any processing differences between the two tropes, do these differences lie in the way in which the lexically encoded content is accessed and dealt with, or do any such differences occur further down the line when deriving inferences.

The development of metaphor and hyperbole understanding has not been discussed in this chapter, but is also of great interest and will be discussed in Chapter 4, where the additional three questions will be addressed:

5 Do we see any difference in the age at which children acquire the ability to comprehend hyperbole and metaphor?
6 Is there a correlation between the development of figurative language comprehension capacities and the development of inhibition control capacities?
7 Do we see a difference in how contingent the different tropes are on the development of Inhibition Control?

The findings reported in chapters 3 and 4 are important as they will contribute to our understanding of a) how figurative language processing differs from the processing of literal language, if it differs at all, b) how figurative language interpretation affects lexical processing, c) whether the processes and mechanisms underlying metaphor and hyperbole comprehension differ, d) When children develop the ability to accurately interpret metaphoric and hyperbolic language, and e) Whether that ability is contingent on the development of inhibitory control capacities. Moreover, in shedding light on these issues, our findings will serve to verify some of the claims made by the current pragmatic and psychological accounts discussed in Chapters 1 and 2.

3 REPORT OF OUR ADULT STUDIES INVESTIGATING METAPHOR AND HYPERBOLE PROCESSING

3.1 INTRODUCTION

This thesis is centered round a number of important questions: What processes and mechanisms are involved in arriving at metaphoric and hyperbolic interpretations? What factors affect our ability to derive such figurative interpretations and the speed at which we can derive them? Are metaphoric interpretations just a further broadening of the encoded meaning than hyperbolic interpretations, or is there something unique about metaphor due to the comprehension processes involved and/or the interpretation arrived at? In an attempt to answer these questions, in this chapter I will report findings from a series of studies in which we directly contrast the processing of metaphoric and hyperbolic statements.

Metaphor (e.g. the politician's speech was noxious) and hyperbole (e.g. The earl grey tea was noxious) are two common types of figurative language. Both are seen as types of non-literal language, in which the meaning the speaker intends to communicate is not that which is lexically encoded. Both transfer information from a 'vehicle' term (e.g. Noxious) to a 'topic' term (e.g. Tea). It can be assumed that when a speaker chooses to use a metaphoric or a hyperbolic utterance of the form X is Y, they have a topic in mind, and certain properties or features they want to attribute to that topic. In order to do this, they choose a vehicle term that exemplifies this set of properties or features.

In this thesis my aim is to investigate the processes and mechanisms involved in arriving at metaphoric and hyperbolic interpretations, and in doing so, try to determine whether there might be something unique about metaphor due to the interpretation processes involved, or whether metaphoric interpretations are just a further broadening of the encoded meaning than hyperbolic interpretations.

There is a plethora of past and current theoretical literature on metaphor (see chapter 1), which over the last few decades has either been backed up, or drawn into question by an ever-increasing amount of psycholinguistic research investigating metaphor

processing (see chapter 2). In contrast, despite recent unified accounts of figurative language (Wilson and Carston 2007; Carston 2002) there has been little, if any empirical research looking at hyperbole or other tropes. This leaves us with an important question; can what we know about the processing of metaphor be generalised to other tropes such as hyperbole? With this question in mind, this chapter will be dedicated to the discussion of findings from four on-line studies, in which we directly contrast metaphor and hyperbole processing in a series of reading-time, word naming and eye-tracking experiments.

3.1.1 PREVIOUS FINDINGS AND SOME REMAINING QUESTIONS

Together, the empirical findings discussed in chapter 2 reveal an interesting picture of metaphor processing. It appears that literal meanings are not default, and metaphoric interpretations are available from the beginning of processing. Familiar metaphors are quicker and easier to process than unfamiliar metaphors. Metaphor irrelevant information associated with the linguistically encoded content appears to lose activation after a metaphoric interpretation has been derived, possibly as a result of active suppression. Furthermore, while there are empirical data presented in support of all of the current accounts of metaphor discussed in this thesis, perhaps the most robust findings support the concept construction accounts in which all but the most conventionalized metaphors are interpreted as category assertions, where said category is constructed on-line on the basis of the context and the encoded content.

Despite the quality and depth of research investigating metaphor processing, I can see two important remaining questions, which I hope the findings I present in this chapter will shed light on.

1. Deactivation of irrelevant meanings - Active suppression or passive decay?

As was discussed in chapter 1, whether figurative utterances of the form X is Y are processed as categorization statements (Carston 2002; Sperber and Wilson 2006; Wilson and Carston 2007; Recanati 2001, 2004; Glucksberg and Keysar 1990; Glucksberg 2001) as their syntactic structure suggests, or whether they are seen as

implicit comparison statements (Clement & Gentner, 1991, Forbus, Gentner, & Law, 1994; Gentner, Rattermann, & Forbus, 1993, Wolff and Gentner 2011), and processed as such is a matter for debate. Moreover, whether it is 'relevance' or 'salience' that guides our interpretation of non-literal language, or whether metaphoric meanings can be accessed directly from the lexicon, is still a point of contention. However, most current accounts (with the exception of the Graded Salience Hypothesis) share the assumption that while processing novel nominal metaphors (e.g. My defence lawyer is a shark), features associated with the literal meaning of the metaphor vehicle lose activation, though no claims are made with respect to whether this deactivation would result from active suppression, or passive decay (due to lack of attention).

As discussed in chapter 2, in the context of language processing, suppression is understood as an active reduction in the activation of a given representation, which is in contrast with a representation automatically decaying. Gernsbacher and Faust (1991) and Gernsbacher and St John (2002) posit a 'general mechanism of suppression' within their 'structure building framework'. They argue that incoming information that is consistent with already represented information is utilized during meaning construction, whereas incoming information that is inconsistent or irrelevant must be actively suppressed.

In contrast, other models of cognition (e.g. Anderson 1983) propose that un-stimulated mental representations are left to automatically decay. For example, the activation level of the literal meaning of a metaphor vehicle, in a metaphor biasing context, would automatically decay, because it would not be stimulated by the context. However, as discussed above, many current accounts of metaphor processing propose that irrelevant meanings, or at least features associated with irrelevant meanings are actively suppressed.

Both the passive decay and the active suppression hypotheses predict that the activation of irrelevant meanings in a metaphor biasing context will decrease after a certain delay. However it is in a neutral context that the two hypotheses make differing predictions. According to the decay hypothesis, both the literal and metaphoric meanings would lack stimulation, and thus, both would decay. On the other hand, as a neutral context offers no trigger for suppression, the suppression hypothesis predicts that, after a delay, both meanings would remain as activated as

they were initially (Gernsbacher and Faust 1991; see Rubio-Fernandez for full discussion).

Gernsbacher and Faust's (1991) data support the suppression hypothesis; both meanings of ambiguities were equally activated after a delay, suggesting that based on bias contextual information, irrelevant meanings are actively suppressed during the resolution of ambiguities. It would therefore follow, that the same is true of irrelevant meanings in a figurative biasing context, during the processing of a figurative statement. Indeed, many findings, suggest that active suppression does take place during the processing of novel metaphors.

As discussed in chapter 2, a number of studies suggest that active suppression of metaphor irrelevant properties/meanings takes place during metaphor comprehension (see section 2.1.4). However, of those that directly assessed activation levels of irrelevant information, few of the findings are free from alternative interpretations (see section 2.1.4). It is unclear whether an 'equal to baseline' affect on metaphor processing conditions is indicative of active suppression taking place during metaphor comprehension. In order to confidently assert that metaphor interpretation requires the on-line suppression of metaphor irrelevant information, further evidence is required. By carrying out word naming experiments we aim to shed more light on how metaphor comprehension can affect the activation level of irrelevant information.

2. Can we generalize what we know about metaphor to hyperbole?

Most current accounts entail that all non-literal utterances of the form X is Y are processed in the same way, regardless of whether we might categorise such utterances as a metaphor (e.g. the politician's speech was noxious) or as a hyperbole (e.g. the earl grey tea was noxious). Relevance theoretic lexical pragmatists (Wilson and Carston 2007; Carston 2002) explicitly posit a unified concept construction account of figurative language in which they claim that all utterances in which a vehicle term (e.g. 'shark' in 'that defence lawyer is a shark') is used to convey a broader sense than that which encoded (e.g. metaphor, hyperbole, approximation), are processed in the same way. Furthermore, although Glucksberg and colleague's class-inclusion account (Glucksberg and Keysar 1990; Glucksberg 2001), Giora's Graded Salience Hypothesis (Giora 1997; 2002), Gibbs' Direct Access account (Gibbs 1990; 1992) and Gentner and colleagues' structure mapping account (Clement & Gentner, 1991,

Forbus, Gentner, & Law, 1994; Gentner, Rattermann, & Forbus, 1993, Wolff and Gentner 2011) only discuss metaphoric statements, all these accounts predict that hyperbolic statements with the same nominal structure would be processed via the same mechanisms and procedures (see chapter 1 for full discussion).

As mentioned, there is little, if any, research comparing metaphor and hyperbole. Recent on-line empirical research has focused almost exclusively on metaphor despite the current, unified accounts discussed above. This means that, as yet, we are unable to determine whether those unified accounts discussed, adequately capture the processes involved in both metaphor and hyperbole comprehension, or whether earlier philosophical accounts (Black 1962, 1979; Davidson 1978) were right to treat metaphor as a unique phenomenon, worthy of its own account.

The findings reported in this chapter will allow us to investigate the processes and mechanisms underlying metaphor and hyperbole, and they will also allow us to directly contrast the processing of metaphors and hyperboles. Our reading time data will allow us to observe potential differences in processing effort/time between the two tropes. Many factors effect reading-time, which means that any reading-time difference could be indicative of additional processing effort at the level of accessing the linguistically encoded meaning via the lexicon, or further down the line when deriving inferences about the implicit content of the statement. As word naming tasks allow concept activation levels to be measured, our word naming data will allow us to see whether there are any differences between metaphor and hyperbole comprehension with respect to processing of the linguistic form (i.e. the activation levels of irrelevant lexically encoded representations after arriving at hyperbolic and metaphoric interpretations).

The findings from the 4 experiments reported in this chapter are important as they will contribute to our understanding of a) how figurative language processing differs from the processing of literal language, if it differs at all, b) how figurative language interpretation effects lexical access and processing, and c) whether the processes and mechanisms underlying metaphor and hyperbole comprehension differ. Moreover, in shedding light on these issues, our findings will serve to verify some of the claims made by the current pragmatic and psychological accounts discussed in chapters 1 and 2.

3.2 EXPERIMENT 1: READING-TIME EXPERIMENT CONTRASTING METAPHOR AND HYPERBOLE

3.2.1 INTRODUCTION

The hyperbole and metaphor reading time data which are reported below will allow us to directly contrast the reading times of target sentences preceded by literal, hyperbole, and metaphor biasing contexts. Finding a significant difference between the reading times target sentences in the three different trope conditions will give us a preliminary indication, based on the predictions above, of whether those aspects of the current theories discussed in chapter 1, adequately capture the processes involved in metaphor and hyperbole comprehension, and of whether a unified account of the two tropes can be maintained.

Most of the current accounts discussed in chapter 1 (Wilson and Carston 2007; Sperber and Wilson 2006; Glucksberg and Keysar 1990; Glucksberg 2001; Clement & Gentner 1991; Gentner and Wolff 1997; Gibbs 1990; Giora 1997, 2002) would not predict there to be any difference in reading times between metaphors, hyperboles and literal statements, other things being equal. Each of the accounts posit a non-sequential processing model (i.e. there is no default literal interpretation from which an alternative interpretation must be subsequently derived) in which the lexically encoded content and the context dependent content are accessed and derived in parallel. This means that, all things being equal, figurative interpretations should not take any longer to process than literal interpretations. Moreover, as discussed above, all of the accounts explicitly propose or entail that metaphors and hyperboles are processed in the same way. Therefore, based on the workings of these accounts, other things being equal, we would not expect the processing of either trope to be more effortful or lengthly than the other.

Participants were required to read a series of target sentences; each of which contained a specific target word (e.g. 'it was an **assault'**), which was to be interpreted literally, hyperbolically or metaphorically depending on the biasing context. The reading-times of the target sentences in the three different trope conditions were recorded, allowing us to observe whether the same target sentence takes a different

amount of time to process depending on whether it is interpreted metaphorically, hyperbolically, or literally.

In addition, we also measured whether context length affected the reading-times of the target sentences by having two context length conditions for each target sentence in each trope condition. Indeed, it was thought that context length may affect reading times: a longer context provides more time for appropriate features to be activated, and therefore perhaps lessens the need for suppression of irrelevant features, in the cases of metaphor and hyperbole. As discussed in section 2.1.1, Ortony et al. (1978) found that metaphors took no longer to read than literal statements, provided that the context was long enough. In the short context condition, metaphors took significantly longer to read than literal statements. The authors' interpretation of this interaction was that the short context condition did not provide appropriate schemata for interpreting the metaphoric targets.

3.2.2 PRELIMINARY OFF-LINE RESEARCH IN PREPERATION FOR EXPERIMENT 1

Preliminary research was carried out in order to guide the construction of highly controlled figurative materials to be used in our first experiment, in which we compare the reading-times of target sentences when preceded by metaphor, hyperbolic and literal biasing contexts. Due to the sensitive nature of reading-time tasks, it was essential that the figurative materials used were completely novel and designed specifically for the experiments discussed in this thesis, and that they adhered to a specific set of criteria which was put in place to ensure that we were able to make an accurate, direct comparison between the processing of novel metaphoric, hyperbolic and literal sentences.

A series of target sentences (the reading-time of which was to be measured) and context sentences (6 per target sentence (2 metaphoric (1 short, 1 long), 2 hyperbolic (1 short, 1 long), and 2 metaphoric, (1 short, 1 long)) were constructed for our first, reading-time experiment. Table 1. illustrates the 6 different context conditions for the target sentence 'it was a forest':

Table 1. Context sentences for target sentence ‘it was a forest’.

Short Literal Context
Sam and Mark went for a walk in a national park;
Long Literal Context
Sarah and Mark loved doing things together at the weekend. Sometimes they went shopping. Sometimes they decided to go and visit friends in different cities. They didn’t get to spend that much time with each other during the week so they looked forward to the weekends. This weekend it was sunny and they went for a walk in the local national park;
Short Hyperbolic context
The back yard definitely needed pruning;
Long Hyperbolic Context
When they had bought their house they had been attracted to it because of the size of the garden. They loved how it was big enough for the children to kick a ball around and have some fun. Their previous garden had been very small. They had not bargained for how much work it would involve though. It needed pruning all the time;
Short Metaphoric context
Sam always got lost. The university was enormous;
Long Metaphoric context
Sarah had begun her first year at university. Even though she had gone to a large state school, nothing could have prepared her for the size of her university campus. It took her a while to even find where her department was. In her first weeks, she was always getting lost. The university was enormous and pretty intimidating;

The target sentences were designed using the criteria below;

(a) In all of the descriptions (contexts and target sentences combined), an object or concept in the context, is described using the target word in the target sentence (e.g. A fridge is described as a monster, or earl grey tea is described as noxious).

(b) The hyperbolic and metaphoric descriptions differed in one way: A metaphorical description can never be literally true no matter how much you manipulate the context. However, a hyperbolic description can be literally true if the context is modified slightly. In the hyperbolic descriptions, if the contexts were changed slightly, the object or concept depicted in the context, could be literally described using the target word in the target sentence (e.g. a garden could literally be described as a forest if the land is in fact a large, dense area of trees). However, in the metaphoric descriptions, the object or concept depicted in the context, could never be literally described using that target word, even if the context were changed in some way to facilitate this (e.g. a politician's speech can never be literally described as noxious).

The contexts were all written with the following considerations in mind;

a) The metaphor, hyperbole and literal contexts clearly induce either a metaphoric, hyperbolic or a literal interpretation.

b) The contexts themselves were written using only literal language. Any loose uses which may be included were highly conventionalised.

c) The contexts did not just translate the target sentence into literal language; it introduced the sentence, but without being sufficient to allow participants to guess its meaning.

d) All efforts were made to ensure that the degree to which the target sentence followed the context was as similar as possible in the metaphoric, hyperbolic and literal conditions (i.e. it was ensured that all target sentences flowed as naturally as possible from the preceding context sentence).

In order to ensure that the contexts and materials created adhered to the guidelines in (a) to (d), two questionnaires were constructed etc. The aim of the first questionnaire was to establish whether the experimental items constructed clearly biased either a hyperbolic, metaphoric or literal interpretation, as was intended. The aim of the second questionnaire was to ensure that the context passages/sentences were all free from words which might directly prime the target word in the target sentence (i.e. it was a **forest**.

Questionnaire 1

Procedure

Thirty-eight native, English speaking participants (recruited via email) were presented with 27 target sentences. Each participant saw 7 of the target sentences in metaphoric contexts, 7 in hyperbolic, and 7 in literal contexts. Which target sentences appeared in which context was counterbalanced across participants. In addition, 21 participants saw the target sentences in short contexts and 17 saw them in long contexts. They were asked to decide whether each target sentence should be interpreted literally, hyperbolically or metaphorically. They were then asked to rate how much the target sentence related to the context on a scale of 1- 7 (1 being if the context and target sentence bear no relation to one another, and 7 being if they are extremely related). We calculated the mean sliding scale score (between 1 and 7) for each target item in each context.

Results

If a target sentence had a mean sliding scale score of below 3 in any of the contexts then it would not have been included. However, all target items had a mean sliding scale of above 3, and were therefore not rejected on that basis. If a target sentence was consistently misinterpreted, then it was rejected and removed from the experimental materials. If it was fairly consistently correctly interpreted in two context conditions, but was often misinterpreted in one of the context conditions, then we changed that context, in order that it more clearly biased the intended interpretation[24]. These changes were checked with a group of eight UCL linguists, who all verified the materials. Any contexts which were biasing a literal interpretation, in a figurative condition, or a figurative interpretation, in a literal condition, three or more times, were changed, and the target item was kept. If they were misinterpreted in the wrong way more than five times, then the whole target sentence was removed. Target

[24] One problem (which was detected after the questionnaire was run), was that the first task relied upon people having a clear understanding of the distinction between hyperbole and metaphor, which they did not. Although it was explained what hyperbole was at beginning of the questionnaire, it is a complex notion to comprehend and use accurately in a task of this nature. This invalidated participants responses on whether they interpreted something metaphorically or hyperbolically. When participants stated that they interpreted a target sentence in a metaphor biasing context, hyperbolically, or vice versa, this could not be taken as an indication of whether this was in fact the case, because they could not reliably distinguish between hyperbole and metaphor. Thus, we did not always change or reject target sentences in which participants had interpreted them metaphorically in hyperbolic biasing contexts, or vice versa.

sentences were also removed if it was impossible to change the context, which was inducing misinterpretations. In addition, all target sentences were checked by the same group of scholars, and a whole target item was removed if the feedback from the group had been that the item was too conventional, or did not adhere to the criteria.

Questionnaire 2

We also ensured that all contexts were free of any words that may have had a direct priming effect on the target sentence. In order to achieve this, a questionnaire based on the research of Rosch and Mervis (1975) and Barsalou (1987), was used to identify strong associates of the target words within the target sentences, which may have had a direct priming effect.

Procedure

21 native, English speaking adults also recruited via email (a different set of participants from those who responded to the first questionnaire) completed the questionnaire, which comprised two different tasks: a brief definition task and a free association task. Again, the questionnaire included the list of 27 target words which could potentially have been included in the critical target sentences in the experiment (i.e. *chewed, noxious, novel, tree,* etc.), of which 21 were finally selected for the study. For each target word, participants were asked to first, briefly define the word, and then secondly, list up to 5 words which they associated with the target word.

Results

It was the case that none of the words which were present in the participants' answers had been included in the contexts[25]. Thus, no words which participants either associated with the target words, or used to define the target words, were included in the contexts.

[25] Probably because materials were constructed with this issue in mind.

3.2.3 METHOD

Participants

Sixty native English speaking adults aged between 18 and 40 took part in this study. They were recruited through the University College London psychology subject pool, and received a £3 compensation for their time.

Procedure

We measured the time it took participants to read a target sentence under different conditions of target interpretation (in hyperbolic, metaphoric, and literal contexts). We used a now standard reading time methodology (see, e.g., Ortony et al. 1978 and Inhoff et al. 1984 among many others) in which reading-times of a series of sentences were recorded from the onset of the sentence on the screen, until the participant hit a designated key on the keyboard or response box. The specific design of our reading-time experiment was, however, completely novel. Participants were asked to read a series of short target sentences preceded by a literal, hyperbolic or metaphoric context, on a laptop screen. The target sentences contained a target word which should have been interpreted either literally, hyperbolically or metaphorically, depending on the biasing context. For example 'it was a **forest**' (see table 1 above). In the present study, the context conditions were between subjects, such that the preceding contexts were short (5-13 words) for half the participants, and long (55-86 words) for the other half

For example:

Short: '*The back yard definitely needed pruning;*'

Long: '*That night was the first night that I had ever walked home from town on my own. I usually got a taxi with some friends. I just couldn't be bothered to pay loads of money that night. I was walking past a bar and this guy just shouted at me. I was a bit tipsy and I just felt really angry. I couldn't control myself. That is when I got involved in the crime.'*

After reading and understanding the context passages, which appeared in one complete passage on a single computer screen, participants were asked to press the spacebar to bring up a new screen on which the target sentence appeared. Participants were asked to press the spacebar again when they had read and understood the sentence. Following one third of the target sentences, they were then asked to answer

a comprehension question (e.g., for metaphor context and target sentence 'our new flat had a huge silver, double fridge- It was a monster', the comprehension question was 'do you think the fridge is alive'). This was to ensure that they were focused on understanding the passages and not just reading them. Target sentences were randomly selected to be followed by a comprehension question. Before the critical materials began, participants saw five practice trials. These trials all had the same structure as the critical trials, and they all had literal interpretations.

Participants were tested individually. Prior to the start of the experiment, each participant received instructions regarding the procedure (i.e. what buttons to press and what they will see on the screen). They were told that the experiment is a simple, computer-based experiment that is looking at how we process language. No information about the exact relationship between the context and target was provided.

Materials

As discussed above, all stimulus materials were designed for the purposes of this experiment and were judged to be completely novel. For half of the participants, the target words were preceded by short contexts, for the other half they were preceded by long contexts. See Table 2 below, for a complete set of contexts for the target sentence 'it was noxious'.

Table 2. A complete set of context sentences for the target sentence 'it was noxious'

Short Literal Context
The varnish he was using was a new brand;
Long Literal Context
John was decorating his bedroom. He had been meaning to do it for ages. Something always came up that meant it wasn't a good time to start it. Finally, he had enough money and time, and he had started the job. He started by varnishing his old wardrobe. He bought a special varnish which his friend recommended;

Short Hyperbolic context
Earl grey was a drink I was always forced to have at work, and I hated it;
Long Hyperbolic Context
I am pretty fussy about what tea I drink. I do often like a hot mug of fruity tea just before I go to bed. That way I am not kept awake from the caffeine. Mostly I just like a good cup of English breakfast tea. You can't go wrong with it, it's nice and simple. The other day, I was forced to drink earl grey;
Short Metaphoric context
The politician's end of year speech was typical;
Long Metaphoric context
I had to watch that politician on TV last night. I cannot believe how out of date his policies are. He just drones on with the party line the entire time. He doesn't seem to have any positive new ideas of his own. People like him will drag the country backwards. His style of politics was typical of today;

The target sentences and contexts were constructed using a strict set of criteria and considerations (see section 3.1.1-3.1.2).

Counterbalancing

Three experimental sentence lists were created, each list containing the same 21 target sentences. The three lists differed with respect to their prior contexts. No target sentence was seen twice by a single participant, so in each list, 7 target sentences were preceded by a context consistent with a literal interpretation, 7 were preceded by a metaphor biasing context, and 7 target sentences were preceded by hyperbolic biasing contexts. Which target sentences were preceded by which type of context was counterbalanced across the three lists. For example, if a target sentence (e.g. *It was noxious)* was preceded by a metaphoric consistent context (*The politician's style of politics was typical)* in the first list, then it was placed in a literal context (*The varnish he was using was a new brand)* in the second list, and a hyperbolic context (*He had to drink earl grey and he hated it)* in the third list, and so on. Each list contained seven passages in each of the three conditions (literal, metaphoric, hyperbolic). The order in which the target sentences appeared was randomized for each participant. The trope

condition was within subjects, so each participant was randomly assigned to one list so that they only saw each target sentence once, in one condition. The context length condition was between subjects, so half of the participants saw the target sentences in long contexts, and half saw them in short contexts.

Apparatus

The experiment was carried out using a small laptop computer, positioned on a table. Participants sat on a chair, up to the table and operated the computer. The texts were presented in lower case, font size 24. The experiment was programmed using e-prime (Psychology software tools inc.).

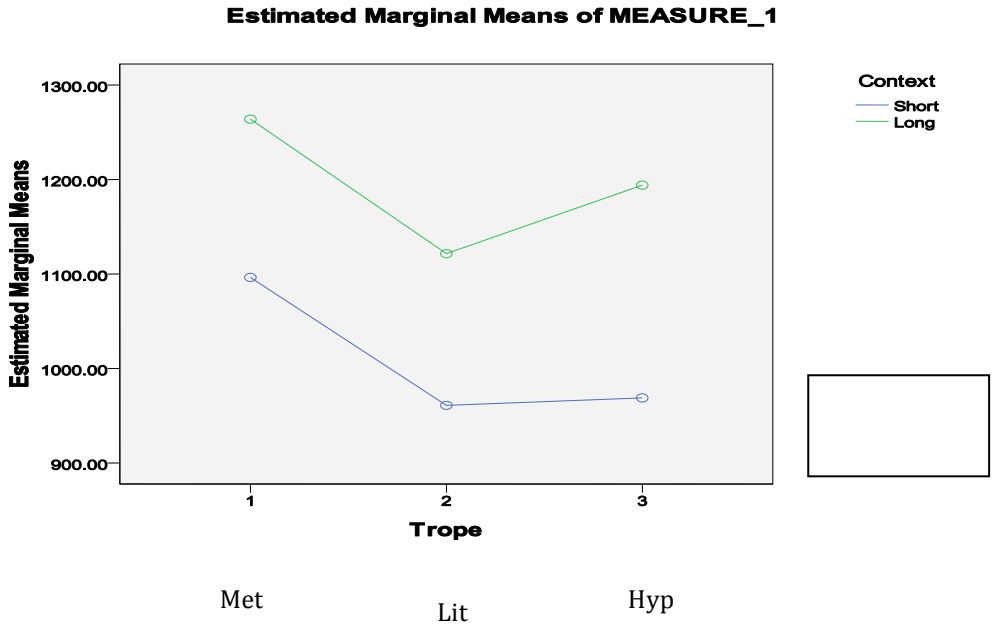
Data analysis

The dependent measure in this experiment was sentence reading time. The independent variables were type of trope, and context length. Trope was within-subjects, and context length was between subjects. The sentence reading time was calculated by the length of time from the onset of the target sentence text, to the response on the keyboard.

3.2.4 RESULTS

Participants reading times of target sentences in the three different trope conditions, and the two context length conditions are illustrated in Figure 1.

Figure 1. Mean reading times



Analysis of variance in reading times, between (context length condition) and within (trope conditions) groups, was calculated using a split plot ANOVA (with participants as the random variable (F_1) and items as the random variable (F_2)), with context length group as the between subjects factor, and trope as the within subjects factor. A main effect of the context length ($F_1(1, 56)=5.69$ $p=.020$, $F_2(1, 40)=20.49$ $p<.001$) indicated a difference between reading times in the long and short conditions. We also found a main effect of trope ($F_1(2, 112)=15.57$ $p<.001$, $F_2(1.89, 75.77) = 9.54$, $p<.001$) pointing to a difference between reading times in the three trope conditions. Yet, there was no significant interaction between factors ($F_1(2, 112)=.959$, $p=0.387$, $F_2(1.89, 75.77)=1.49$, $p=.231$), indicating that the relationships between all three tropes were the same in both long and short contexts.

Contrary to our expectation (based on Ortony et al.'s (1978) findings) that a longer context might facilitate interpretation, as illustrated in Figure 1, participants took significantly longer to read the target sentences in the long condition than in the short condition. The most obvious interpretation of this result is that the longer contexts required a heavier dependence on memory and generally more processing effort.

In contrast with previous reading-time studies (Ortony et al. 1978; Inhoff et al. 1984), post hoc Bonferroni corrected pairwise comparisons indicate that target sentences

took longer to read when preceded by a metaphoric biasing context than when preceded by a literal biasing context ($p<.001$), and in contrast with the predictions of most of the current accounts discussed in this thesis (Wilson and Carston 2007; Carston 2002; Glucksberg and Keysar 1990; Glucksberg 2001; Clement and Gentner 1991; Wolff and Gentner 2011; Gibbs 1990; Giora 2002), there were significantly longer reading times for metaphors over hyperboles (Bonferroni, $p=.002$).

Finally, further post hoc pairwise tests revealed no significant difference between reading times of hyperboles and literal sentences (Bonferroni, $p=.245$). Hyperboles appear to be processed more like literal sentences than metaphors.

3.2.5 DISCUSSION

The context length effect

Participants in Experiment 1 read target sentences that could be interpreted metaphorically, literally or hyperbolically, depending on the bias of the preceding context. Overall, we found that when the context was longer, response times on target sentences were longer. This result is likely to be due to the fact that richer/longer contexts require a greater call on memory when deriving inferences; in the long contexts, the participants had more context to recall in order to mutually adjust the context and the explicit content of the utterance in order to arrive at its final interpretation. Furthermore, the extra information contained in the longer contexts would mean that there were likely to be more inferences drawn. This effect may have outweighed any positive effect the context may have had in facilitating understanding (i.e. priming relevant features of the vehicle concept).

Metaphoric vs. literal conditions

The significant difference between the reading times of the target sentences in the literal and metaphor conditions seems to be in contradiction with earlier findings (see section 2.1.1). Indeed, Ortony et al. (1978) and Inhoff et al. (1984) found that metaphors took no longer to read than literal statements, provided that the context was such that it heavily biased the metaphoric interpretation, and provided that the context

was long enough. One possible explanation for our differing findings, is that the metaphors used in the above studies were conventionalized, if not idiomatic (e.g. "regardless of the danger, the troops marched on"), whereas the metaphors and hyperboles designed for our study were completely novel. Among others, (Blank, 1988; Blasko & Connine, 1993; Gentner and Wolff 1997; Gernsbacher, 1984; Camac & Glucksberg, 1984; Glucksberg, Gildea, & Bookin, 1982; Grauwe; Swain, Holcomb and Kuperberg 2010) Bowdle and Gentner (2005) show that figurative meanings can become conventionalised, and are then processed more like literal language. Such conventionalised metaphors are considered to be instances of polysemy, in which both the figurative and literal readings have been stored in the lexicon as separate entries. If the metaphors used in Ortony et al.'s study were conventionalised, then the reading times for metaphors may not have differed from literal statements, because their processing may in fact be akin to that of an ambiguous literal sentence.

The reading-time difference between the metaphor and literal conditions is not inconsistent with the current accounts discussed in chapter 1. It could be explained, at least in part, by the number of inferences derived in the two conditions. The more inferences an interpretation generates, the heavier the dependence on memory will be, since the context (previous conversation and surrounding linguistic material) must be recalled in order for the inferences to be integrated into the discourse. Therefore, the more inferences there are, the longer the interpretation process will take. Metaphoric interpretations are likely to yield many more inferences than equivalent literal statements, especially if the figurative statement is embedded within a rich context. The richness of a metaphoric interpretation, could mean that it takes longer to derive than a comparable literal interpretation, which would explain why our target sentences took longer to read when they were to be interpreted metaphorically, than when they were to be interpreted literally.

Another factor that could potentially be influencing reading-times is suppression. Previous findings (Rubio- Fernandez's 2004, 2007; Gernsbacher et al. 2001; McGlone and Manfredi 2001) suggest that suppression of figurative irrelevant features takes place during metaphor comprehension. Such findings empirically support all the current pragmatic and psychological accounts discussed in this thesis (all of which entail that the lexically encoded vehicle concept would lose activation during processing in a metaphor biasing context in which it is irrelevant), with the

exception of Giora's Graded Salience Hypothesis (Giora and Fein 1997; Giora 2002), which claims that metaphor irrelevant information is not discarded during the processing of novel metaphors. If metaphor interpretation does require the active suppression of irrelevant information, then perhaps this could, at least in part, explain why metaphors take longer to process.

Rubio-Fernandez concluded from her (2004;2007) findings that the kind of suppression involved in metaphor interpretation is a more time-consuming attentional process which occurs later on in processing than the automatic suppression involved in other pragmatic processes such as disambiguation. If this is the case, then any comprehension process which requires the active, attentional suppression of irrelevant information would potentially take longer than one which does not. Therefore, if metaphor irrelevant meanings must be actively suppressed in order to arrive at an appropriate metaphoric interpretation, then it is plausible that the processing of a metaphoric utterance would take longer than that of a literal utterance, which corresponds to what we find.

Metaphoric vs. hyperbolic conditions

We also found that hyperbolic interpretations took no longer to arrive at than literal interpretations, and both took significantly less time to process than metaphoric interpretations. It is possible that metaphoric interpretations are richer than hyperbolic interpretations (more inferences are derived when arriving at a metaphoric interpretation than when arriving at a hyperbolic interpretation), meaning that metaphors take longer to interpret than hyperboles, however, as both our metaphoric and hyperbolic items are completely novel, it seems unlikely the interpretations arrived at in the metaphoric condition would be richer than those arrived at in the hyperbolic condition.

Another possible explanation for the lack of difference between the reading times of hyperboles and literal sentences, and the significant difference between the reading times of hyperboles and metaphors, is that hyperbolic interpretations do not draw on costly attentional suppression processes as metaphoric interpretations do.

Rubio-Fernandez argued that it is only metaphor **inconsistent** features which require active suppression because such features are in direct conflict with arriving at a figurative interpretation, it is possible that figurative irrelevant features in hyperbolic utterances are not inconsistent, but just irrelevant, and therefore do not require active suppression. For example, the feature LOSS OF SIGHT is completely inconsistent with the interpretation of 'blinding' which will be constructed when comprehending the metaphor 'The new novel was **blinding**'. However, the same feature LOSS OF SIGHT would be irrelevant when deriving a hyperbolic interpretation of 'my new lamp is **blinding**', as the lamp will not likely be so powerful that it will cause loss of sight, but it is not inconsistent with the interpretation that the lamp is so bright that it hurts one's eyes, or affects one's sight.

This interpretation of the data needs to be further investigated in a follow up study, which will enable us to specifically look at the activation levels of figurative inconsistent features, at different stages of processing of both hyperboles and metaphors. Findings from a word naming study (experiment 3), which allows us to do this are discussed in section 3.4.

How do the theoretical accounts measure up to our findings?

A unified account of metaphor and hyperbole?

If metaphors and hyperboles do have processing differences, then this is not predicted by either the Relevance theoretic unified account (Wilson and Carston 2007; Sperber and Wilson 2006), or any of the current accounts that entail that metaphoric and hyperbolic utterances of the same form are processed in the same way (Glucksberg and Keysar 1990; Glucksberg 2001; Clement and Gentner 1991; Wolff and Gentner 2011; Giora 2002; Gibbs 1990). Our findings are not inconsistent with the broad outline of these accounts, as the same processes and mechanisms may well still be involved in metaphor and hyperbole comprehension, but there must be something unique about a metaphoric interpretation which means that it takes longer to arrive at than hyperbolic and literal interpretations.

The reading-time differences observed in our data could be caused by processing differences either at the level of accessing and processing the lexically encoded respresentations (i.e. whether irrelevant lexically encoded information must be suppressed or not), or further down the line, when deriving inferences (i.e. how rich the interpretation arrived at is).

A discontinuity account?

The finding of a significant difference between the reading-times of metaphors and hyperboles does not go against Carston and Wearing's (2011) Relevance Theoretic discontinuity account of figurative language, as they manage to retain a unified account while proposing that there is something unique about metaphor. According to their account metaphor is not unique because the processes and mechanisms involved in metaphor interpretation are distinct from those involved in other broadening tropes, but because metaphoric interpretations are different. A metaphoric interpretation contains an occasion specific concept that has a narrower, as well as broader interpretation than that which was encoded by the metaphor vehicle. However a hyperbolic interpretation contains an occasion specific concept that has just a broader denotation than that which was encoded by the hyperbole vehicle.

The dual directionality of the lexical adjustment procedure during metaphor interpretation may result from the category violation that is typically present in metaphoric interpretations (e.g. politician's speeches cannot be literally described as 'noxious', thus the metaphoric utterance 'the politician's speech was noxious' contains a category violation).

Moreover, it is perhaps this category violation that triggers the active suppression process. The category violation may mean that the core features of the encoded vehicle concept are in direct conflict (inconsistent) with the metaphoric interpretation, requiring them to be actively suppressed, and if there is no category violation in hyperbolic statements, then the core features of the encoded concept may be irrelevant but not inconsistent.

A possible alternative explanation of our reading-time experiment

There is, potentially, an alternative interpretation of the above reading-time data. Although, in pre-tests for the reading-time experiment, we used a brief definition task

and a free association task to ensure that the contexts did not contain any direct associates which may have a priming effect on the target word (see section 3.2.2), this cannot rule out the possibility of the presence of indirect associates, which may also have a priming effect on the target sentence.

By running the priming experiment discussed, which is discussed in the next section, we hope to rule out the possibility that our hyperbole and literal target sentences were quicker to read because the preceding context sentences had more of a priming effect on the target word, than the contexts preceding the metaphor target sentences.

3.3 EXPERIMENT 2: FOLLOW-UP WORD NAMING EXPERIMENT, RULING OUT POTENTIAL PRIMING EFFECTS

3.3.1 INTRODUCTION

The aim of the experiment was to rule out an alternative, priming interpretation of the reading-time difference found in the previous study. We wanted to ensure that the reading-time differences observed in the reading-time data were not due to facilitation effects in the literal and hyperbolic conditions, resulting from the presence of indirect associates in the latter conditions.

For this experiment, and experiment 3, we used a word naming task (Macdonald and Just 1989), which allows us to measure of the activation level of a concept when placed in different contexts. In this paradigm, a subject reads a text followed by a probe word that he or she must then name out loud into a microphone. It has been found that the response to the probe word is generally faster if it is related to a word or multiple words that have just been read (McKoon & Ratcliff, 1980), as a result of priming. Priming effects are generally taken as a measure of word activation (Meyer & Schvaneveldt 1971). Such facilitation effects are usually interpreted as the result of a spreading activation process, according to which, when processing a word such as ‘tea’, activation spreads to conceptually associated words like ‘coffee’, speeding up their identification (Meyer & Schvaneveldt 1973). Therefore, via spreading

activation, words within a context sentence could activate some concept(s), which may facilitate a naming response to the following probe word, by priming the concept encoded by that probe word.

For this experiment, participants read the same context sentences (plus nine additional items) as in experiment 1. However, this time, the target sentences, which followed the contexts in the previous experiment, were removed. Therefore, for each trial, participants only read one sentence; a context sentence. Following the context sentences, participants were presented with a probe word, which in the case of the experimental items, was always the target word from the target sentence which had been removed (e.g. for the target sentence 'it was noxious', the probe word was 'noxious'). When this probe word appeared, participants were required to name the word out-loud, and word naming latencies were recorded.

If the quicker reading times for the hyperbolic and literal items, over the metaphoric items was due to the context sentences in the literal and hyperbolic conditions containing more indirect associates than in the metaphoric condition, then the context sentences alone, as presented to the participants in this present experiment, would have a priming effect on the probe (target) words, causing word naming latencies to be shorter in the literal and hyperbolic conditions, than in the metaphoric condition.

3.3.2 METHOD

Participants

Thirty-eight monolingual, adult speakers of English, aged between 18 and 40 were recruited through the UCL psychology experiment subject pool to take part in the experiment, and were compensated with £4 for their time.

Materials

Twenty-one of the experimental items used were adapted from those used in the reading-time experiment discussed above. A further 9 experimental items of the same format as those constructed for the reading-time experiment were constructed to be

used in experiment 3, and were adapted for use in this experiment, resulting in 30 experimental items.

For example:

Metaphor: A politics degree gives you a clearer perspective of society; it is a window.

Hyperbole: I can see out of that hole in the wall you made for the gas pipe; it is a window.

Literal: There is something at the top of the stairs which lets so much light into the big hall way; it is a window.

These materials were constructed using the same criteria as the ones used for Experiment 1, and also underwent the same questionnaire pre-tests (see section 3.2.2) on a sample of 30 monolingual, English speaking adults[26].

As in the first experiment, there were 3 experimental conditions: (a) Metaphoric, (b) Hyperbolic, and (c) literal. However, for the purposes of this priming experiment, the target sentences were removed, so the participants only read the context sentence for each item (e.g. A politics degree gives you a clearer perspective of society.) In contrast to the first experiment, we had only one, short context length condition. All context sentences were between 5 and 13 words in length (the short contexts from experiment 1+9 additional items).

In addition, one probe word was paired with each item (context sentence). This probe word appeared on a single screen, after the participant had read the context sentence. Participants were required to name the probe word aloud when it appeared on the screen. All probe words for experimental items were the target word from the target sentence, which were removed for this experiment.

For example:

Context sentence: A politics degree gives you a clearer perspective of society.

---

[26] However, for this set of new materials, the questionnaire participants were not asked to judge whether they interpreted the items literally, hyperbolically or metaphorically because it was thought that the participants did not have a firm enough grasp of the distinction between hyperbole and metaphor to have accurate intuitions about whether they interpreted the items metaphorically or hyperbolically.

Probe word: Window

In addition to the 30 experimental trials (context sentence + probe word), there were 60 filler trials, and 6 practice sentences. As with the experimental trials, each filler trial consisted of a context sentence, followed by one probe word (e.g. I would quite like to go on holiday to America but it is very expensive; Afford). Twenty of the filler items contained a context sentence which biased a literal meaning of its corresponding target sentence had the target sentence been present (e.g. I would quite like to go on holiday to America but it is very expensive; I don't think I can afford it actually.), but as with the experimental items, the target sentence was removed, leaving just a context sentence, a further 20 of the filler items contained a context sentence which biased a conventional hyperbolic meaning of its corresponding target sentence (e.g. The car hit me so hard as I was cycling along; I was catapulted through the air.), but again, the target sentence was removed, and 20 biased a conventional metaphoric meaning of its corresponding target sentence (Tom can't wait to replace his old car as it has become a bit rusty and unreliable; it is an old tin can these days.), but again, the target sentence was removed. Forty-five of the filler context sentences were followed by 'false' probe words, which were not the target word which appeared in the target sentence that was removed for the purpose of this experiment, and 15 were followed by probe words which did occur in the target sentence that had been removed (true probes), just as in the experimental trials. This distribution of true and false probe trials ensured that true and false probes were counterbalanced across the experiment; all experimental context sentences were followed by a true probe, while ¾ of the filler context sentences were followed by a false probe, and ¼ were followed by a true probe, such that 45 trials included a true probe, and 45 trials included a false probe.

Participants saw 6 familiarization trials before the main experiment began. These were put in place to ensure that participants understood and were familiar with the procedure. The experimenter remained in the room with participants while they responded to the familiarization trials, and corrected them on any aspect of the procedure that they appeared to have misunderstood, or reacted incorrectly to. These familiarization trials had the same form and structure as the experimental and filler items.

Procedure

Subjects began by reading a page of instructions and were then required to press SPACEBAR to initiate the first familiarization trial after the instructions page. The context sentences were then presented on a computer screen in an adaptation of a moving-window display (Just, Carpenter, & Woolley, 1982). At the start of each trial, the display contained a line or two of dashes, representing all non-space characters of the stimulus sentence. Context sentences were read word-by-word; participants hit SPACEBAR to reveal one word at a time. Following the first press of SPACEBAR, the first word of the context sentence appeared at the left margin on the top line, replacing the dashes corresponding to that word. Participants then pressed SPACEBAR in order to advance the moving-window display and reveal each word of the context sentence, one at a time. When SPACEBAR was pressed, the second word appeared, and the first was replaced again by its dashes; subsequent words appeared and were replaced with each successive pressing of SPACEBAR throughout the sentence. Pressing SPACEBAR at the end of the sentence replaced the last word with dashes and the screen changed to the probe word in the centre of an otherwise blank screen. Subjects were required to say the probe word aloud as soon as it appeared. After the 6 familiarization trials, the participants were asked to press SPACEBAR if they were ready to start the main experiment. This initiated the first screen of the first trial, and the same procedure was followed for all 90 experimental items and fillers. The participant's naming of the probe word out-loud triggered the program to move on to the next trial. Subjects wore a small microphone attached to their shirt, and naming time was measured via a Serial Response box which was linked to the E-prime experiment software. The probe word naming latencies were recorded.

Subjects were informed that their response times were to be recorded, and they were encouraged to read and respond quickly while maintaining good comprehension and response accuracy.

Counterbalancing

Three lists were created. The three lists differed with respect to the contexts. In the first list, 10 probe words were preceded by a context consistent with the literal interpretation (had the target sentence been present), 10 were preceded by metaphoric consistent contexts, and 10 were preceded by hyperbolic consistent contexts. In the

second and third lists, the probe words appeared in different contexts, so the probe words which were placed in a literal context in list 1, were placed in a context consistent with a metaphoric interpretation in the second list, and in the third with a hyperbolic interpretation. If a probe word (e.g. *noxious)* was preceded by a metaphoric consistent context (*The politicians style of politics was typical)* in the first list, then it was placed in a literal context (*The varnish he was using was a new brand)* in the second list, and a hyperbolic context (*He had to drink earl grey and he hated it)* in the third list, and so on. Each list contained ten passages in each of the three conditions (literal, metaphoric, hyperbolic). The trope condition was within subjects, so each participant was randomly assigned to one list so that they only saw each probe word once, in one condition. The order in which the probe words appeared was randomized for each participant (except the 6 familiarization trials, which were always presented in the same order).

Apparatus

The experiment was carried out on a laptop computer, positioned on a table. Participants sat on a chair, up to a table and operated the computer. The texts were presented in lower case, font size 24. The experiment was programmed using e-prime.

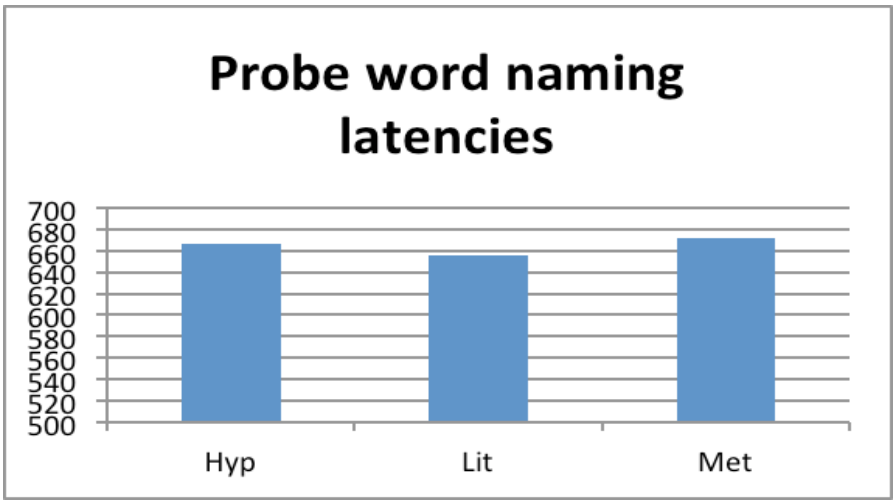
Data analysis

The dependent measure in this experiment was probe word naming latency. The independent variable was type of trope. Trope was within-subjects. The probe word naming latencies were calculated by the length of time from the onset of the probe word, to the voice onset of the naming response.

3.3.3 RESULTS

Participants' word naming latencies for probe words after the three different trope conditions are illustrated in Figure 1.

Figure.2 Mean word naming latencies



Analysis of variance in word naming latencies, within groups was analysed using a One-way ANOVA (with participants as the random variable (F_1) and items as the random variable (F_2)), and trope as the within subjects factor. There was no main effect of trope ($F_1(2, 108)=.098$ $p=.907$, $F_2(2, 86) = 1.133$, $p=.327$) indicating that there was no difference between word naming latencies in the three trope conditions. Outlier data points which were more than 3 standard deviations from the mean were removed before analysis.

Pairwise comparisons indicate that there is no difference in probe word naming latencies between the three conditions (Lit – Hyp p=1.000, Hyp-Met p=1,000, Lit-Met p=1.000). This finding indicates that the literal and hyperbolic contexts do not prime the probe word any more than the metaphoric contexts, and therefore, the reading time difference found in our previous experiment must be due to some factor other than greater priming effects in the literal and hyperbolic contexts.

3.3.4 DISCUSSION

Participants in Experiment 2 read the context sentences that preceded the target sentences in our previous reading-time experiment (either biasing a literal, hyperbolic or metaphoric interpretation of the target sentences), followed by a probe word, which

was always the target word from the target sentences which were removed for the purposes of this experiment. They were then required to respond to a probe word appearing in the centre of the screen by naming it out loud.

The fact that there was no difference in probe word naming latencies in all three conditions suggests that activation levels of the probe word concepts in all three conditions was similar. This suggests that we can rule out an alternative interpretation of our reading-time data; namely that the significantly quicker reading times of hyperboles over metaphors could have been the result of the hyperbolic contexts having more of a priming effect on the target sentences than the metaphoric contexts. If this were the case, then the hyperbolic and literal contexts alone should have primed the probe words, causing the activation level of the lexically encoded probe word concepts to be higher in those conditions, than in the metaphoric condition.

This finding means that the reading-time difference found in experiment 1 must be caused by some difference in the processes required in order to arrive at a metaphoric or hyperbolic interpretation, and we cannot rule out the tentative conclusion that the significant reading-time difference between hyperboles and metaphors is due to the time-consuming active suppression process being unique to metaphor interpretation.

In the next section I will present our findings from a second word-naming study in which participants read the same series of context sentences and probe words, as in the priming study discussed in this section, only this time, the target sentences were re-inserted after the context sentence for each item. Comparing probe word naming latencies in the different context biasing conditions, will allow us to observe activation levels of concepts encoded by the probe words. In all three experimental conditions, the concept encoded by the probe word would have been primed by the presence of the probe word in the preceding target sentence. Thus, finding a difference between any of the three experimental conditions with respect to probe word activation levels would allow us to infer that the priming effect has been dampened in whichever condition(s) exhibit(s) slower word naming latencies.

3.4 EXPERIMENT 3: WORD NAMING EXPERIMENT INVESTIGATING SUPRESSION DURING METAPHOR AND HYPERBOLE COMPREHENSION

3.4.1 INTRODUCTION

It was hypothesised, based on the results of the previous reading-time experiment, that one of the factors contributing to longer reading-times for metaphors over hyperbolic and literal statements is the role of active suppression during the processing of novel metaphors. If the interpretation of novel hyperbolic statements does not involve the time consuming process of active suppression, then this would explain why hyperbole reading times were significantly shorter than metaphor reading-times, and akin to the reading-times of literal statements.

In this current word naming experiment, participants read the same series of context (e.g. *Sam and Mark went for a walk in a national park;)* and target sentences (e.g. *it was a forest)* as were used in experiment 1 (plus, 9 additional items (e.g. *My husband always manages to hide and block out all the negative things about life; he is a curtain to hide behind*)- all pretested in the same way as the initial items. See section 3.2.2). However this time, the sentences were followed by a probe word-naming task (the probe word being the target word from the target sentence, e.g., *'forest')*. It was hypothesized that the manipulation of the context to prime either a literal, hyperbolic or metaphoric interpretation would affect the activation level of the mental representation of that probe noun, and thus, affect the probe word naming latencies, causing these latencies to significantly differ in the different contexts.

In all three experimental conditions, the concept encoded by the probe word would have been primed by the presence of the probe word in the preceding target sentence. Thus, finding a difference between any of the three experimental conditions with respect to probe word activation levels would allow us to infer that the priming effect has been dampened in whichever condition(s) exhibit(s) slower word naming latencies. If either or both of the figurative conditions exhibit slower word naming latencies, then we will be able to infer that figurative language interpretation affects priming.

Significantly slower word naming latencies in the metaphor condition over the hyperbole condition would support our hypothesis (based on our findings from experiment 1) that active suppression of inappropriate meanings takes place during the processing of metaphors, but not during the processing of hyperboles. In both conditions, aspects of the encoded vehicle concept are irrelevant for interpretation, which means that, unless active suppression of that encoded meaning has taken place in one condition, but not the other, activation levels in the two conditions should be similar.

If we do find similar activation levels in both the hyperbole and metaphor conditions, then this would indicate that the reading-time difference between the metaphor and hyperbole conditions found in Experiment 1 requires an alternative explanation.

3.4.2 METHOD

Participants

40 monolingual, adult speakers of English, aged between 18 and 40 were recruited through the UCL psychology experiment subject pool to take part in the experiment. Participants were compensated for their time with £4.

Materials

As Experiment 2, each participant saw 30 experimental trials. Twenty one were the same as in Experiment 1 and had therefore, already been pretested to ensure that they adhered to a number of formal criteria (see section 3.2.2), and a further 9 were constructed for the purpose of this experiment, and experiment 2 (and all were pre-tested using the same questionnaires as were used for pre-testing the original 21 items. See section 3.2.2). For the purpose of this experiment, coda material was added to the end of each of the target sentences in order to avoid the target word being at the end of the target sentence, and subsequent wrap up effects (e.g. “Sam always got lost because the university was enormous; it was a forest **with winding paths**.”). There is evidence from reading experiments (Aaronson & Scarborough, 1976; Just & Carpenter, 1980; Rayner, Sereno, Morris, Schmauder, & Clifton, 1989) that the

processing load on working memory is greatest at the end of a clause, and therefore eye fixations in this area are longer. Therefore, constructing our items such that the target word is at the end of the sentence could mean that participants would fixate on this word for longer than they would if it were earlier on in the sentence, which could then affect activation levels of the encoded concept, which would affect the outcome of a word naming task. The coda material was added to each item to avoid this problem.

As in experiment 2, in addition to the 30 experimental items, there were 60 filler trials (20 literal fillers, 20 conventionalised metaphoric fillers and 20 conventionalised hyperbolic fillers) and 6 practice sentences (however, as with the experimental items, the target sentences were re-inserted for the purpose of this experiment). As with the experimental items, each filler context sentence + target sentence (e.g. The car hit me so hard as I was cycling along; i was catapulted through the air) was followed by one probe word. Again, forty-five of the fillers were followed by false probes (probe words which did not occur in the preceding target sentence) and 15 were followed by true probes (probe words which did occur in the preceding target sentence), like the experimental items. This counterbalanced true and false probes across the experiment, as all the experimental items were followed by true probes.

A comprehension statement (which participants had to verify) followed 50% of fillers and experimental items (5 of the experimental literal items, 5 of the experimental metaphoric items, and 5 of the experimental hyperbolic items, 10 of the literal fillers, 10 of the metaphoric fillers, and 10 of the hyperbolic fillers). Again, comprehension statements were counterbalanced so all comprehension statements for the experimental items and 15 of the filler comprehension questions required a *true* response, and 45 of the comprehension statements for the fillers required a *false* response *(*5 true and 15 false for literal fillers, 5 true and 15 false for metaphoric fillers, and 5 true and 15 false for hyperbolic fillers). The comprehension statements were designed to ensure that the participants have understood the sentences either hyperbolically, metaphorically or literally.

Participants saw 6 familiarization trials before the main experiment began. These had the same form and structure as the experimental and filler items (2 literal/2 metaphoric/2 hyperbolic). Three of these trials were followed by comprehension

statements to ensure that participants were properly reading and attempting to understand the sentences.

Procedure

The procedure was exactly the same as in the priming, word-naming experiment, discussed above. However, for the purposes of this experiment, the target sentences as well as the context sentences were presented on the computer screen in an adaptation of a moving-window display (Just, Carpenter, & Woolley, 1982). At the start of each trial, the display contained a line or two of dashes, representing all non-space characters of the stimulus sentence. Context and target sentences were read word-by-word; participants hit SPACEBAR to reveal one word at a time. Following the first press of SPACEBAR, the first word of the context sentence appeared at the left margin on the top line, replacing the dashes corresponding to that word. Participants then pressed SPACEBAR in order to advance the moving-window display and reveal each word of the context and target sentences, one at a time. Having read both the context and target sentences, participants hit SPACEBAR one final time to reveal the probe word in the centre of an otherwise blank screen. Subjects were required to say the probe word aloud as soon as it appeared. After the 6 familiarization trials, the participants were asked to press SPACEBAR if they were ready to start the main experiment. This initiated the first screen of the first trial, and the same procedure was followed for all 90 experimental items and fillers. The participant's naming of the probe word out-loud triggered the program to move on to the next trial. Subjects wore a small microphone attached to their shirt, and naming time was measured via a Serial Response box, which was linked to the E-prime experiment software. The probe word naming latencies were recorded.

Subjects were informed that their response times were to be recorded, and they were encouraged to read and respond quickly while maintaining good comprehension and response accuracy.

In addition, for the purpose of this experiment, following 50% of trials, an entire comprehension statement was presented on a new screen when the subject responded to the probe. Subjects were required to judge whether this statement was consistent with the sentence by pressing Y for yes or N for no. In the other 50% of trials in which there was no comprehension statement, the program moved straight on to the

next trial. Again, probe word naming latencies as well as the responses to the comprehension statements were all recorded.

Again, subjects were informed that their reading and response times were to be recorded, and they were encouraged to read and respond quickly while maintaining good comprehension and response accuracy.

Counterbalancing

Counterbalancing was exactly the same as in the priming, word naming experiment discussed above (see section 3.3.2 above)

Apparatus

All apparatus was the same as in the priming experiment discussed above (see section 3.3.2 above).

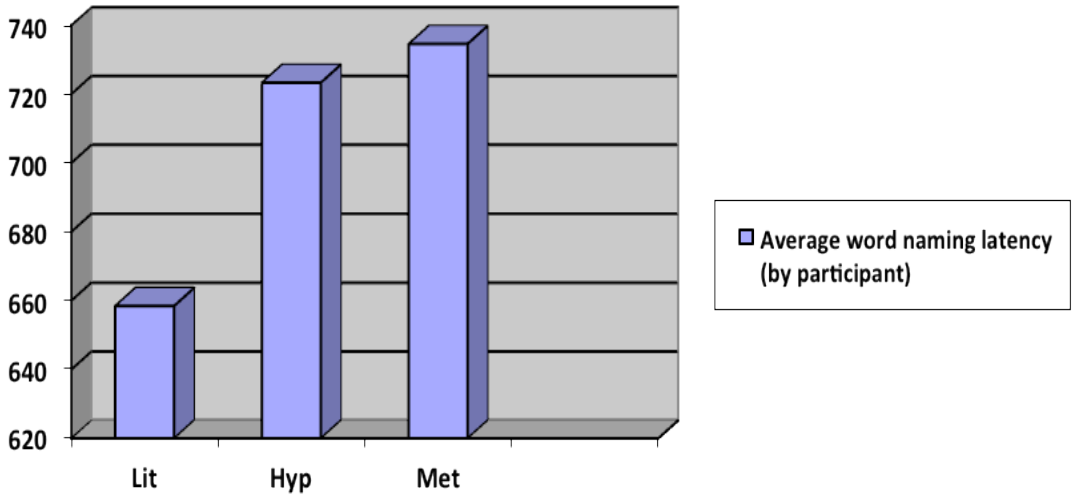
Data analysis

Again, the dependent measure in this experiment was probe word naming latency. The independent variable was type of trope. Trope was within-subjects. Again, the probe word naming latencies were calculated by the length of time from the onset of the probe word, to the voice onset of the naming response.

3.4.3 RESULTS

Participants' word naming latencies for probe words after the three different trope conditions are illustrated in Figure 1.

Figure 3. Mean word naming latencies



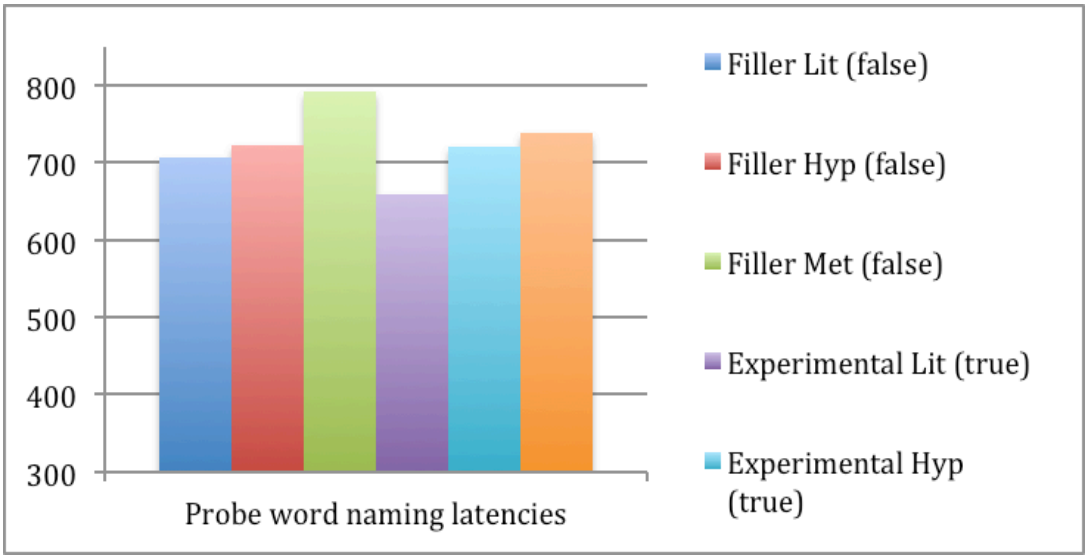
Analysis of variance in word naming latencies, within groups was analysed using a One-way ANOVA (with participants as the random variable (F_1) and items as the random variable (F_2)), and trope as the within subjects factor. A main effect of trope ($F_1(2, 80)=3.380$ $p=.039$, $F_2(2, 58) = 3.166$, $p=.050$) pointed to a difference between reading times in the three trope conditions. Outlier data points that were more than 3 standard deviations from the mean were removed before analysis.

Pairwise comparisons indicate that probe words took longer to name when preceded by a metaphoric item than when preceded by a literal item ($p=.014$). However, in contrast to our expectations based on our previous reading-time data, post hoc pairwise tests also revealed significantly longer word naming latencies after hyperboles than after literal items ($p=.046$) (marginal by participants, $p=.066$), and no significant difference between word naming latencies after metaphoric and hyperbolic items ($p=.699$).

Finally, further analysis (see figure 4 below) revealed that all three filler conditions (literal, conventional hyperbole, conventional metaphor), in which the probe word was not the same as the target word in the preceding target sentence (false probes), differed significantly (F1 $p <.0001$; F2 $p=.03$) from the experimental literal condition (difference between the hyperbole filler condition and the literal experimental condition was just marginal by items $p=.07$) only, and did not differ from the experimental metaphor and hyperbole conditions (F1 $p=.904$; $p=.765$; F2 $p=.501$;

p=.547). In short, probe word naming latencies when the probe word was not present in the preceding context (and thus priming had not occurred) were comparable to those in which the probe word had appeared in the preceding target sentence (and had therefore been primed), but in a hyperbolic or metaphoric biasing context.

Figure 4. Mean word naming latencies- false probes vs. true probes



3.4.4 DISCUSSION

Participants in our third study read target sentences that could be interpreted metaphorically, literally or hyperbolically, depending on the bias of the preceding context. They were then required to respond to a probe word (the target word from the target sentence just read) appearing in the centre of the screen by naming it out loud.

Longer probe word-naming latencies in the metaphor and hyperbole conditions over the literal condition suggest that activation levels of the lexically encoded target concept in the literal condition are higher than in both figurative conditions. Longer word naming latencies are a reliable indicator of the concept denoted by that word, or at least core features of it, having lost activation, and as we can see in our data, word naming latencies are slower after hyperbolic items than after literal items, just as they were after metaphoric items, indicating that deactivation takes place in hyperbole interpretation, just as it does in metaphor interpretation. Thus, the reading-time difference between metaphors and hyperboles, and the lack of difference between the

hyperbole and literal conditions, observed in experiment 1, cannot be attributed to metaphor comprehension requiring active suppression, where hyperbole does not. Deactivation of the lexically encoded vehicle concept, whether resulting from active suppression or passive decay, occurs during the interpretation of both tropes, to the same degree.

Furthermore, comparable probe word naming latencies in all three filler conditions (in which the probe word had not appeared in the preceding target sentence) and the experimental metaphor and hyperbole conditions (in which the probe word had appeared in the preceding target sentence), suggest that deactivation of the encoded vehicle concept occurred in both the experimental figurative conditions, enough to completely dampen the effects of priming.

A reduction in priming in the figurative conditions, could result from two factors:

1. Suppression
2. A lack of attention on the linguistic representation due to it not being utilised during the derivation of inferences

It seems reasonable to conclude that a complete negation of priming effects is likely to be the result of active suppression, but this cannot be confirmed. We did not get a below baseline (filler conditions) effect, which would have provided conclusive evidence of suppression during metaphor and hyperbole comprehension, but as Rubio-Fernandez' (2006) data (see section 2.1.4) suggest, suppression may not in fact operate below baseline.

Moreover, as activation levels of the linguistic representations corresponding to the metaphor/hyperbole vehicles did not differ, the reading-time difference cannot be attributed to a differing role of suppression during metaphor and hyperbole interpretation. Whether the difference between the literal and both figurative conditions is the result of active suppression, or lack of attention is yet to be determined, but our results clearly illustrate that figurative language interpretation negates the effects of priming.

We have shown that the reading-time difference (between metaphors on the one hand, and literal and hyperbolic statements on the other) does not stem from processing differences at the level of accessing and processing the lexically encoded vehicle representation (i.e. irrelevant lexically encoded information is suppressed during both metaphor and hyperbole comprehension). Therefore, the reading time difference must be caused either by differences between metaphors and hyperboles with respect to the lexical items that input to this process (i.e. there may be differences between typical metaphor topic and vehicle pairings and typical hyperbole topic and vehicle pairings), or by differences further down the line, when constructing an accurate interpretation of the utterance as a whole, complete with inferences (see section 3.7 for full discussion).

How do the theoretical accounts measure up against this finding?

This finding supports most of the current pragmatic and psychological accounts discussed in this thesis. The Relevance Theoretic lexical pragmatic accounts, Glucksberg and colleague's class-inclusion account, Gentner and colleagues' structure-mapping account (Wilson and Carston 2007; Sperber and Wilson 2006; Carston 2002; Carston and Wearing 2011; Glucksberg and Keysar 1990; Glucksberg 2001; Clement and Gentner 1991; Wolff and Gentner 2011) all entail that the lexically encoded vehicle concept should lose activation during processing in a metaphor biasing context in which it is irrelevant. Moreover, they all entail that all figurative statements of the form X is Y are interpreted via the same processes and mechanisms, regardless of whether we categorize them as hyperboles or metaphors. Therefore our finding that the activation levels of lexically encoded vehicle concepts pattern the same in metaphoric and hyperbolic context, is consistent with these accounts.

On the other hand, Giora's Graded Salience Hypothesis states that metaphor irrelevant information is not discarded during the processing of novel metaphors. Therefore, it is not clear how the Graded Salience Hypothesis can account for these word-naming data.

3.5 EXPERIMENT 4: EYE-TRACKING EXPERIMENT CONTRASTING METAPHOR AND HYPERBOLE

3.5.1 INTRODUCTION

The reading-time data discussed in section 3.2, suggests that there are processing differences between the two tropes; metaphors took significantly longer to process than both hyperboles and literal statements, which did not differ significantly from one another. The aim of running an eye-tracking study (in collaboration with Nicola Spotorno (PhD candidate at the L2C2 lab, Lyon) with the same materials, is to obtain a more detailed analysis of participants' reading patterns.

Having found evidence of strong deactivation of lexically encoded vehicle concepts taking place during the processing of both metaphors and hyperboles (see section 3.2), it has been possible to rule out the possibility that the reading-time difference between metaphors and hyperboles stems from processing differences at the level of accessing and processing the lexically encoded vehicle representation (i.e. irrelevant lexically encoded information is not suppressed during metaphor comprehension, but not during hyperbole comprehension). However, the question still remains as to what it is about the derivation of a metaphoric interpretation that causes it to take longer than the derivation of a literal or hyperbolic interpretation.

Eye-tracking is a more fine-grained paradigm than reading-time, and should therefore, allow us to draw more precise conclusions about where the difference(s) between metaphor and hyperbole interpretation lies. There is a large literature validating the use of fixation time measure to access higher order cognitive processing (see Rayner and Morris 1990 for a thorough review). This literature strongly suggests that there is a close relationship between what a reader is looking at, and what a reader is processing. For example, word frequency and lexical ambiguity have been found to directly influence the initial processing time that readers spend fixating on a word. Moreover, Poyner and Morris (2003) demonstrate that the eye-fixation duration measures are sensitive to the process of generating inferences. Furthermore, Folk and

Morris (1995) discovered that if readers are forced to abandon an interpretation mid way through a text (on the basis of some new conflicting information) in order to arrive at an appropriate interpretation, they tend to spend additional processing time on the new information which has led to them having to abandon their original path of interpretation, and/or to re-analyse the preceding text, which is reflected in 'second-pass' reading-times.

By tracking the participants' eye fixations as they interpret target sentences metaphorically, hyperbolically and literally, we will be able to see in real-time, the regions within the contexts and target sentences that they are fixating on at any given point during processing. Reading-times provide us with a measure of a quantitative difference between the processing of the two tropes, but the use of different kinds of eye-tracking measures (e.g. total reading time, total first-pass time, total second-pass time; frequency of regressions to preceding text) should allow us to make inferences about the existence of qualitative differences between the processing of metaphors and hyperboles, and to identify if and where difficulties arise when processing the different tropes.

First-pass time is all the time spent in a region of a sentence before exiting to either the left or the right of that region. Second-pass time includes all the time spent re-reading in a region. First-pass time gives some indication of early processing, whereas second-pass time and regressions into a region allow one to make inferences about reanalysis and the process of integrating interpretations into the given context.

It will be necessary to analyse several regions of interest in our experimental items: the topic in the context sentence (e.g. the politician's), the rest of the context sentence, which helps subjects to interpret the figurative meaning of the target sentence (e.g. end of year speech was typical;), the topic in the target sentence (e.g. it), the vehicle in the target sentence (e.g., noxious), the coda/spill-over region (e.g. and disgusting).

Potential findings

Based on the reading-time difference (between metaphors on the one hand, and hyperboles and literal statements on the other) observed in experiment 1, it is

reasonable to predict that at least one of the following potential findings will be borne out in the data from this experiment.

1. We may replicate the previous reading-time data, and find that the target sentences in the metaphor condition take longer to read than in the literal condition. However there are some critical differences between the design of this present experiment and experiment 1. Firstly, coda/spill over material has been added to the target sentences (e.g. it was noxious **and disgusting**) for the purpose of this experiment (as well the word naming experiments), which could have an affect on reading-times (of the main target sentence i.e. it was noxious). Secondly, the context and target sentences will be presented together on one screen in this experiment[27], where they were presented on separate screens in experiment 1, which could also effect reading-times.
2. We may find that the first-pass time on the target word/vehicle region (e.g. noxious) will be longer in the metaphor condition than in the hyperbole/literal conditions, as more processing effort may be required in the metaphor condition in order to access relevant conceptual information from the vehicle concept.
3. We may find that the second-pass time on the target word/vehicle region will be longer in the metaphor condition than in the hyperbole/literal conditions, as more reanalysis of the context may be required during metaphor processing, and/or because the contextual integration process (i.e. the process of integrating inferences into the surrounding discourse) may be longer in during metaphor processing.
4. We may find that total time in the target word/vehicle region is longer in the metaphor condition over the other two conditions, as a result of longer first-pass and/or second-pass times in that region in the metaphor condition.
5. The sum of fixations from the time that the vehicle region is first entered until a saccade transgresses the right region boundary (regression path reading-time) may be greater in the metaphor condition than in the hyperbole and literal conditions, as this includes fixations made to re-inspect earlier portions of text, and is usually taken to reflect early processing difficulty along with (at least some) time spent re-inspecting the text in order to recover from such difficulty.

[27] As we need to be able to track regressions from the target sentence back to the context sentence.

6. Total fixation time and/or second-pass time in the spill-over/coda region may also be longer in the metaphor condition than in the hyperbole/literal conditions as a result of differing integration times in the three conditions (i.e. integration of inferences into the surrounding context being more time consuming in the metaphor condition).
7. There may be more regressions to and/or longer second-pass time spent on the portion of the context that supports the figurative interpretation of the target sentence in the metaphor condition than in the hyperbole and literal conditions. This could a) reflect a greater dependence on the context when interpreting a metaphor, in order to construct a 'common ground' between the vehicle and topic concepts (as the topic and vehicle concepts are typically less semantically related in metaphoric statements than in hyperbolic and literal statements. See section 3.7), and b) suggest that more effort is required in order to integrate a metaphoric interpretation into the surrounding context, than is required when doing the same with a literal or hyperbolic interpretation.
8. Finally, there may be more regressions to and/or longer second-pass time spent on the topic region (potentially to both the pronoun in the target sentence and the actual topic term in the context sentence) in the metaphor condition than in the hyperbole/literal conditions, as a) more reanalysis of the topic may be required during metaphor processing, and/or b) because the contextual integration process (i.e. the process of integrating inferences into the surrounding discourse) may be longer during metaphor processing.

If differences like the ones illustrated above are also found between the hyperbole and literal conditions, this means that the two phenomena differ at a level of grain that cannot be detected by the reading-times task used in experiment 1.

3.5.2 METHOD

Participants

Thirty monolingual, English speaking adults, aged between 18 and 40 were recruited from the UCL psychology subject pool. Participants were compensated with £4 for their time.

Materials

Twenty-one of the experimental items were exactly the same as those used in experiment 1, except with additional coda material added to the target sentences (e.g. Earl grey was a drink I was always forced to have at work, and I hated it; it was noxious **and disgusting)** in order to avoid subsequent 'wrap up effects' (Aaronson & Scarborough, 1976; Just & Carpenter, 1980; Rayner, Sereno, Morris, Schmauder, & Clifton, 1989). In addition, a further 9 items with exactly the same format (context+ target sentences), which were constructed for the purpose of experiment 2 and 3 (e.g. The rug which was hanging on the washing line is thankfully giving us some shade; it is a curtain to hide behind) were also used, meaning that there were a total of 30 experimental items (see appendix for full list of materials).

The 60 fillers constructed for the purpose of experiment 2 and 3 were also used as fillers in this present experiment (20 target sentences preceded by a literal biasing context (e.g. There was an enourmous cake on the table; it was chocolate and rich), 20 target sentences preceded by a conventional metaphor biasing context (e.g. The car hit me so hard as I was cycling along; I was catapulted through the air), and 20 target sentences preceded by a conventional hyperbole biasing context (e.g. That cheese on toast was just what I wanted; it was a feast to remember).

As with the previous experiments, there were 6 familiarization trials (2 literal/2 hyperbolic/2 metaphoric). These were in place to ensure that participants were familiar with the format and procedure by the time the main experiment started.

Procedure

Each trial consisted of a context sentence (e.g. The rug which was hanging on the washing line is thankfully giving us some shade;) and a target sentence (e.g. it is a curtain to hide behind) presented on a computer screen. Both sentences were presented together on one screen. Participants were required to 'read-for-understanding' the context and target sentence, at a normal rate, and hit SPACEBAR to indicate that they had read and understood them. The pressing of SPACEBAR initiated the next trial. The eye-tracker scanned participants' eye movements as they read the materials.

As in experiment 1, following half of the target sentences, they were asked to answer a comprehension question (e.g. for the metaphor context and target sentence "our new flat had a huge silver, double fridge; it was a monster, it was", the comprehension question was "Do you think the fridge is alive?"). The comprehension question was to ensure that they were focused on understanding the passages, and not just reading them without understanding. Target sentences were randomly selected to be followed by a comprehension question.

Before the critical materials began, participants saw five practice trials. These trials had the same structure as the critical trials, and they all had literal interpretations.

Apparatus

Materials were presented on a desktop computer screen positioned on a table. Participants sat on a chair, up to the table and operated the computer using the keyboard. Text was presented in lower case, font size 24. A Tobii eye-tracker was used to track participants' eye-fixations while reading.

Data analysis

We measured the time spent reading target sentences in novel metaphor, hyperbole and literal biasing contexts. We also measured first-pass and second-pass time for single word and multi word regions of interest within the context and target sentences (e.g. the topic in the context sentence, the rest of the context sentence, the topic in the target sentence, the vehicle in the target sentence, and the spill over region of the target sentence). We also measured regressions into each of the regions of interest in the context and target sentences. I report ANOVAs treating participants and items as random effects. The independent variable is fixation time, and the dependent variable is trope.

3.5.3 RESULTS

Figures 5-7 illustrate participants' first-pass and second-pass fixation times in the regions in which differences were found. Outlier data points that were more than 3

standard deviations from the mean were removed before analysis, as were all fixations above 800ms or below 80ms. All data corresponding to 9 participants were also removed (leaving 21 remaining participants) before analysis, either because a) they made fixations on region 4 (the vehicle in the target sentence) in fewer than 17 experimental trials and/or b) they recorded eye-fixations on fewer than 15 experimental trials (due to a hardware malfunction). Furthermore, data corresponding to 5 experimental items (i.e. items corresponding to the target sentences 'it was a curtain', 'it was an athlete', 'it was a backpack', 'it was a dictator', and 'it was a monster') were removed (leaving 25 remaining experimental items) before analysis due to an error in the presentation of these items.

Figure 5. First-pass fixation-times region 4 (the vehicle in the target sentence)

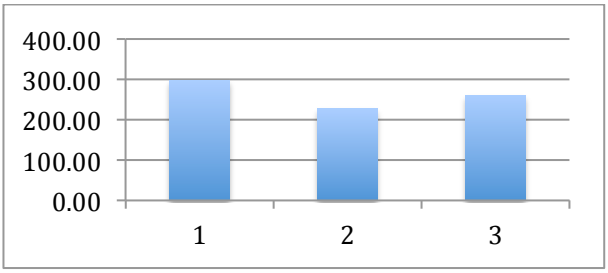


Figure 6. Total fixation-time region 3 (the topic in the target sentence)

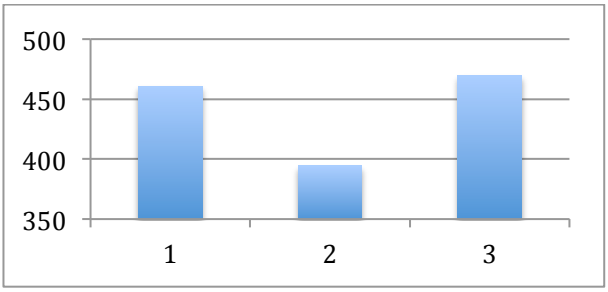
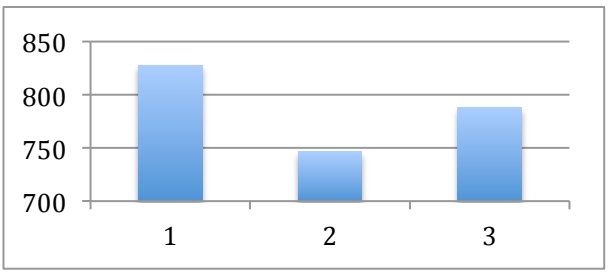


Figure 7. Total fixation-time region 4 (the vehicle in the target sentence)



Analysis of variance in fixation times, within groups was analysed using a One-way ANOVA (with participants as a random variable (F_1) and items as a random variable (F_2)), and trope as the within subjects factor. Likely due to a large amount of

variability in our data, only one of the observed differences were significant. A main effect of trope ($F_1(2, 62)=4.767$ $p=.012$, $F_2(2, 73)= 3.570$, $p=.033$) points to a difference between first-pass times in the vehicle region in the three trope conditions.

Pairwise comparisons indicate that first-pass fixation times on the vehicle were longer when preceded by a hyperbolic item than when preceded by a literal item ($p<.001$). The same difference can also be observed between metaphoric and literal items, but this difference is only marginally significant ($p=.084$). There is no significant difference between the hyperbole and metaphor conditions with respect to first-pass fixation times on the vehicle ($p=.161$)

No other differences between groups with respect to any of the measures (i.e. first-pass time, second-pass time, total time, or regressions any of the regions were found to be significant.

3.5.4 DISCUSSION

Participants' eye movements and fixations were recorded while reading target sentences preceded by metaphoric, hyperbolic, and literal biasing context sentences.

We found that participants' first-pass fixations on the vehicle region of the target sentence were significantly longer when the target sentence was preceded by a hyperbole biasing context than when it was preceded by a literal biasing context. Likewise, participants fixated longer on the vehicle when the target sentence was preceded by a metaphor-biasing context than when it was preceded by a literal biasing context, but this difference was just marginal.

This difference likely reflects early processing difficulties when arriving at the vehicle (e.g. noxious). Participants may fixate longer on the vehicle because it is unexpected following the topic. Furthermore, in both figurative conditions, some pragmatic work must be done in order to arrive at an accurate interpretation of the vehicle term; a set of features associated with the encoded vehicle concept must be selected for attribution to the topic. However, in the literal condition, the vehicle term is just decoded.

It is surprising that we found no difference between the metaphoric and hyperbolic conditions with respect to first-pass fixation times. Our reading-time data clearly illustrate that metaphors take longer to read than hyperboles. If the reading-time differences observed in experiment 1 were caused by longer fixations on the vehicle, then we would expect fixations on the vehicle to be significantly longer following a metaphor biasing context, than following a hyperbole biasing context, but this is not borne out in the data.

Our eye-tracking data suggest that it is not early processing differences that cause the reading-time difference we observed in experiment 1. On the contrary, like our word naming findings from experiment 3, our eye-tracking data suggest that early processing of target sentences (i.e. accessing the encoded vehicle concept and selecting appropriate associated features) is the same in both hyperbolic and metaphoric biasing contexts i.e. more lengthily than in a literal context.

It is surprising that the data did not reveal any significant differences between conditions with respect to any of the other measures (i.e. second-pass time, total time, regressions, regression path). Our reading-time findings (see experiment 1) illustrate that target sentences take significantly longer to read when preceded by a metaphor biasing context than when preceded by a literal or hyperbole biasing context; some factor must have caused this reading-time difference, and the eye-fixation measures recorded in this experiment are designed to pick up on these factors. If there were differences between conditions with respect to reanalysis of the context sentence and/or the process of integrating inferences into the context, then our second-pass fixation times and regression patterns would reflect those differences.

My assumption is that the gaps in our data, caused either by participants skipping regions altogether while reading, or their fixations falling outside of the regions of interest, resulted in the data set not being sizeable enough to reveal some of the predicted differences mentioned above, particularly with respect to second-pass and regression measures. Many participants made no second passes at all, meaning that our second-pass data set was very patchy. Many more participants would be required in order to allow for this kind of data loss.

In summary, firstly, our eye-tracking data reveal an important finding; first-pass fixations on vehicles/target words (e.g. it was **noxious**) are significantly longer when preceded by a metaphor or hyperbole biasing context, than when preceded by a literal biasing context. This finding is in line with our previous word naming data, which suggest that the process of accessing and processing the encoded content of a target sentence is the same in a metaphoric and hyperbolic context, but different in a literal context. Secondly, our eye-tracking data do not suggest that there are any differences in processing with respect to the integration of inferences into the context (no differences between conditions with respect to second-pass fixations and/or regressions to the context region. This is surprising as our findings from experiment 1 indicate that metaphors take significantly longer to process than hyperboles (and literal statements), and this reading-time difference must result from some difference(s) in the processes underlying the interpretation of the two tropes. A more complete and sizeable data set needs to be collected by running the experiment again with many more participants in order to account for the loss of data which is often associated with eye-tracking studies (i.e. due to eye-gaze wandering from the regions of interest and participants missing regions all together during reading).

3.6 SUMMARY OF FINDINGS

In this chapter, I have presented findings from 4 on-line experiments, investigating the processes and mechanisms underlying the comprehension of metaphoric and hyperbolic statements.

Are there processing differences between metaphors and hyperboles?

Experiment 1 yielded some important findings with respect to the processing of metaphoric and hyperbolic statements. We found that target sentences (e.g. it was noxious) took significantly longer to read when preceded by a metaphor biasing context (e.g. The politician's end of year speech was typical) than when preceded by a hyperbole (e.g. Earl grey was a drink I was always forced to have at work, and I hated it) or literal (e.g. The varnish he was using was a new brand) biasing context, and that

there was no reading-time difference between the literal and hyperbolic conditions; this suggests that there are processing differences between metaphors and hyperboles, and that hyperboles are processed like literal statements.

These findings are not inconsistent with the broad outline of the Unified Relevance Theoretic lexical pragmatic account, or any of the other accounts that suggest or entail that hyperbolic statements are processed in the same way as metaphors; the same processes appear to be involved in metaphor and hyperbole comprehension. However, there must be something unique about a metaphoric interpretation that means that it takes longer to arrive at than hyperbolic and literal interpretations, and this warrants some explanation from the current accounts discussed.

The finding of a significant difference between the reading-times of metaphors and hyperboles is consistent with Carston and Wearing's (2011) Relevance Theoretic discontinuity account of figurative language, as they manage to retain a unified account while proposing that there is something unique about metaphor. They argue that metaphoric interpretations result from a narrowing as well as a broadening of the encoded vehicle concept. It is plausible that this dual-directional adjustment in some way causes metaphor processing to be more lengthy than that of hyperbole.

Our findings from experiment 2 confirmed that the reading-time difference found in experiment 1 can't be explained by additional priming effects in the literal and hyperbolic conditions. The word-naming data clearly indicate that the context sentences in all three conditions (metaphoric, hyperbolic, and literal) have an equal priming effect on the target word in the target sentence (e.g. it was **noxious**). Therefore, the reading-time difference must be caused by some difference in the processes required in order to arrive at a metaphoric or hyperbolic interpretation.

Does irrelevant information associated with the literally encoded content lose activation after arriving at a metaphoric interpretation? Is the same pattern of activation visible after arriving at a hyperbolic interpretation?

In line with the previous findings discussed in section 2.1.4, and all of the current accounts discussed in chapter 1 (with the exception of the Graded Salience Hypothesis), our word-naming data from experiment 3 indicate that metaphor interpretation involves the deactivation of irrelevant information associated with the

encoded content, potentially as a result of suppression. Secondly, these findings strongly suggest that the reading-time difference between metaphors and hyperboles does not does stem from processing differences at the level of accessing and processing the lexically encoded vehicle representation.

Thus, these data indicate that the reading time difference must be caused either by differences between metaphors and hyperboles with respect to the lexical items that input to this process (i.e. typical metaphor topic and vehicle pairings may differ in some way from typical hyperbole topic and vehicle pairings), or by differences further down the line, when constructing an accurate interpretation, and deriving inferences (see section 3.7 for full discussion).

Our findings are inconsistent with Giora's account of novel metaphor processing, in which she argues that literal meanings are not discarded during the processing of a novel metaphor in a metaphoric context.

Finally, our eye-tracking data in experiment 4 revealed one important finding: First-pass fixations on vehicles/target words (e.g. it was **noxious**) are significantly longer when preceded by a metaphor or hyperbole biasing context, than when preceded by a literal biasing context. This finding is in line with our previous word naming data from experiment 3, which suggest that the process of accessing and using the encoded content of a target sentence is the same in a metaphoric and hyperbolic context, but different in a literal context.

What is it that is causing the reading-time difference between metaphors and hyperboles? Why does it seem that we can't fully generalize from what we know about metaphor to hyperbole?

Our findings from experiments 3 and 4 mean that we are yet to explain the reading-time difference found in experiment 1. This difference must lie outside of the processes and mechanisms posited for accessing and regulating the activation of the encoded content, as our findings suggest that these processes are the same for the two tropes. In the next section, I will discuss two factors which, I will argue, may contribute to the longer processing times of metaphors over hyperboles and literal statements, and whether the theoretical accounts discussed in chapter 1 can allow for these factors.

3.7 ARRIVING AT METAPHORIC AND HYPERBOLIC INTERPRETATIONS – DIFFERENCES IN PROCESSING EFFORT

The experiments reported in chapter 3 suggest that a) Metaphoric statements take longer to process than hyperbolic and literal statements, which do not differ with respect to processing time, and b) that the processing-time difference between metaphors and hyperboles cannot be attributed to processing differences at the stage of accessing and processing the encoded content of the metaphor/hyperbole vehicle (e.g. it was **noxious**). Activation levels of encoded vehicle concepts (e.g. NOXIOUS) were found to be the same after interpreting a sentence metaphorically and hyperbolically (dampened in both contexts, enough to negate the effects of priming), and the same time was spent initially processing (fixating on) the vehicle term regardless of whether the vehicle term was being processed in a metaphor or hyperbole biasing context (fixations on the vehicle term were longer in both trope conditions than in the literal condition).

Having found that activation levels of encoded vehicle concepts are the same after arriving at both metaphoric and hyperbolic interpretations (dampened in both trope context conditions, relative to the literal context condition), we have ruled out the possibility that the reading-time difference between metaphors and hyperboles could have been caused by active suppression (of irrelevant information associated with the encoded meaning) being unique to the process of metaphor interpretation. Thus we are left wanting for an explanation of the reading-time difference between metaphors and hyperboles; there must be something about deriving a metaphoric interpretation, which is more time consuming than deriving a hyperbolic or literal interpretation. I can see two possible explanations; the cause of this reading-time difference could lie in (a) the relationship between the topic and the vehicle concepts, and (b) the richness/complexity of the interpretation arrived at. I will address each of these explanations below.

3.7.1 THE RELATIONSHIP BETWEEN THE TOPIC AND THE VEHICLE CONCEPTS

The longer reading times for metaphors over hyperboles could be due not to the processes and mechanisms involved in constructing an appropriate interpretation from that which is encoded, but instead, due to the lexical items that input to those processes. The topics in the literal and hyperbolic items are structurally/semantically far more related to the vehicle terms than in the metaphoric items, and, as I will argue, this may have an effect on processing time. See table 3 below.

Table 3. Topic and vehicle terms for a selection of our hyperbole and metaphor items

Hyperbole		**Metaphor**	
Topic	**Vehicle**	**Topic**	**Vehicle**
Rug	Curtain	Husband	Curtain
Hole in the wall	Window	A degree	Window
Kitchen	Factory	Public school	Factory
Mobile phone	Computer	Brain	Computer
Messy desk	Art exhibition	Life	Art exhibition
Big jumper	Duvet	Primary school	Duvet
Ski mask	Blindfold	Privileged childhood	Blindfold
Teacher	Dictator	One's conscience	Dictator
Nursery school	Festival	Bright fish swimming	Festival
Back yard	Forest	University	Forest
Earl grey tea	Noxious	Politician's speech	Noxious

Last season's dress	Mouldy	A music band	Mouldy
Someone pushing past	An assault	An interview	An assault
Living room	Corridor	A mind	Corridor
Knee	Smashed	Confidence	Smashed

All of the accounts discussed in this thesis (see chapter 1) hold that the 'topic' concept plays a role in the interpretation process, and more importantly, the concept construction accounts at least, entail that the semantic relationship between the topic and vehicle may have an effect on interpretation. Moreover, Wolff and Gentner (2011) found evidence of an early symmetrical alignment of the topic and vehicle during the processing of metaphors such as 'some brains are warehouses'. Contrary to Wolff and Gentner's arguments, which are perhaps based on a misunderstanding of the class-inclusion account, this finding seems to be compatible with all the accounts discussed in this thesis. Below, I will illustrate the importance of the relationship between the topic and vehicle during processing, and how this is captured within each of the accounts discussed.

The class-inclusion account

The class-inclusion model states that metaphor vehicles and topics play different but interactive roles – a metaphor topic provides dimensions for attribution, while a metaphor vehicle provides properties to be attributed to the topic. Glucksberg states though, that this does not mean that the relationship between the topic and vehicle concept is not considered (see section 1.6.2 for discussion).

As discussed in section 1.6.2, Glucksberg argues that although the semantic relationship between the vehicle and topic concepts is not considered, topics do vary in terms of the level of constraint they place on interpretation due to how many relevant (to the vehicle) dimensions of attribution they provide. Glucksberg argues that it is how constraining the topic is, along with how good an exemplar the vehicle term is of the properties the speaker intends to attribute, which determines how apt a metaphor is. It follows therefore, that the more relevant (to the vehicle and context)

dimensions of attribution a topic provides (the less constraining it is), the less processing time and effort will be required for interpretation. There is no obvious reason why the topic of a metaphorical utterance should necessarily be any more constraining than the topic of a hyperbolic or literal utterance. In fact, we can clearly see from the selection of topic/vehicle pairings shown in figure 3, that the topic terms alone, are no more or less constraining in the hyperboles than they are in the metaphors. However, when aligned with the superordinate vehicle concept, it is clear to see that the topics in the hyperbole list would clearly provide many more RELEVANT (to the vehicle) dimensions for attribution than those in the metaphor list. This could mean that this alignment process is faster in the processing of hyperboles than it is in the processing of metaphors, which in turn, could make the whole interpretation process quicker for hyperboles than for metaphors. In the case of literal class-inclusions, the topic would be aligned with the basic level vehicle concept and you would again expect the topics of these literal sentences to provide many more RELEVANT dimensions for attribution than those in the metaphoric sentences, thus making the alignment process, and hence, the whole interpretation process, quicker in these cases.

The Relevance Theoretic accounts

Although the unified, Relevance Theoretic account doesn't mention the topic as having a direct role in the comprehension procedure, the account does entail that the topic (and the discourse context) primes relevant encyclopaedic properties of the lexically encoded vehicle concept and these relevant properties/features therefore receive additional activation and are thus more accessible (see section 1.6.1 for full discussion). This means that the more semantically related the topic and vehicle terms are (the more features/properties they share), the more accessible and salient features there will be associated with the vehicle concept, thus speeding up comprehension time.

Relevance theorists Carston and Wearing (2011) claim that dual directional concept adjustment is a defining feature of metaphoric statements, which is intuitive if the topic and the vehicle concepts are less semantically related in metaphoric statements than they are in literal or hyperbolic statements as we can observe in the examples above; the minimal 'semantic overlap' between the topic and vehicle concepts in the

metaphoric items results in the category violation which is characteristic of metaphors, and is therefore, the cause of the required dual directional adjustment of the encoded vehicle concept. The finding of longer reading times for metaphors over hyperboles might, therefore, be predicted by Carston and Wearing's (2011) account, because the topics in hyperbolic statements must prime more relevant features in the vehicle concept than in metaphoric statements, meaning that less processing effort is required during interpretation of the former.

This potential distinction between metaphor and hyperbole put forward by Carston and Wearing (2011) is a quantitative, not a qualitative one. Therefore, although it potentially explains the longer reading times for metaphors over hyperboles, it does not mean that there are any differences between the processes and mechanisms involved in the comprehension of hyperboles and metaphors. Therefore, the unified account originally posited by Wilson and Carston (2007) is upheld.

The structure Mapping account

Structure mapping theory also states that topics play a crucial role in the metaphor interpretation process, as they argue that the comprehension procedure begins with the hearer searching for common predicates between the topic and vehicle (see section 1.6.4 for full discussion). However, crucially, unlike the other accounts discussed in this paper, the structure-mapping account does not talk in terms of 'shared features', or 'semantic similarity'. Instead, it talks in terms of structural similarity. This potentially means that it is not as easy to explain the reading-time difference we found between hyperboles and metaphors, using this account.

Gentner and colleagues argue that the interpretation of comparisons, involves '*the syntactic properties of the knowledge representation'* (Gentner 1983:1) and not the specific content of the conceptual domains. They argue that knowledge is represented as propositional networks of nodes and predicates, and that the predicates express propositions about the nodes. Therefore, according to this account, it is predicates that are mapped between domains, and not features, thus, both attribute predicates (similar to conceptual features or properties in other accounts) and relation predicates are considered in the interpretation process. The consequence of this is that semantic relatedness of topic and vehicle alone, will not determine processing effort, as according to this account, two domains can share few or even no attribute predicates,

but many relation predicates (as in the case of metaphoric comparisons) and the comparison process will proceed just as easily. The structure-mapping engine does not preference one type of predicate over another.

As discussed earlier, according to Gentner (1983), literal comparisons and metaphoric comparisons lie on a continuum. A comparison's positioning on this continuum is determined by the number of attribute predicates (e.g. the base object is YELLOW or LARGE) that are mapped from base to topic. Literal comparisons involve many attribute predicates being mapped from base to target, as well as many relation predicates (e.g. the base object interacts with another object, in the same way as the topic object does), whereas metaphoric or analogous comparisons involve few attribute predicates being mapped, but many relation predicates being mapped. It is clear from looking at the topic/vehicle pairings in a selection of our items in figure 3, that the topics and vehicles in the hyperbole items, share far more attribute predicates than the topic and vehicle pairings in the metaphor items. Furthermore, the topic and vehicle pairings in the literal items (e.g. National park – forest) share even more attribute predicates than in the hyperbole items.

Just as Gentner and colleagues claim, our metaphor items involve many relation predicate mappings from base to target, but few attribute mappings, and our hyperbole items seem to involve many mappings of both types of predicate. Therefore, it seems that Gentner and colleagues would place hyperbolic comparisons somewhere between literal comparisons, and metaphoric/analogous comparisons on the continuum. What isn't clear according to this account though, is if literal comparisons and metaphoric/analogous comparisons differ only in the amount of attribute predicates mapped from base to target, and the structure-mapping engine does not preference attribute predicates over relation predicates, then why would literal and hyperbolic comparisons be significantly quicker to process than metaphoric comparisons?

Without arguing that the structure-mapping engine preferences attribute predicates over relation predicates, it seems that Gentner's structure mapping account does not readily offer an explanation for the reading-time difference we found between literal and hyperbolic items on the one hand, and metaphoric items, on the other.

The Graded Salience Hypothesis

Recall that the Graded Salience Hypothesis entails that figurative statements pertaining to highly salient features of a vehicle concept would be easier to process than those pertaining to less salient features of the same vehicle concept. Again, this aspect of this account could be used to explain how the differing relationship between the topic and vehicle concepts in metaphoric and hyperbolic statements, could contribute to the reading-time difference we found in experiment 1. For example, it could be argued that the statement 'it had been his duvet for years' preceded by the metaphoric context 'Jimmy didn't want to go to secondary school and leave his lovely comforting primary school behind' would be harder to process than the same statement preceded by the hyperbolic context 'Hannah didn't want to throw away her big, old jumper' (both items taken from our experimental materials), because although the metaphor relevant features 'comforting' and 'protective' are indeed associated features of the concept DUVET, they are perhaps not as salient as the features 'warm', 'soft', or 'cosy', which are the relevant features in the hyperbolic context.

Clearly, how salient the relevant features are of the vehicle concept will vary to some degree within tropes, but when examining the experimental materials used in the above experiments (see table 3 for topic and vehicle pairings), it is immediately clear that the hyperbole relevant features of the vehicle concept are far more salient than the metaphor relevant features of that same concept. It is easy to see how this would result from the observed difference in semantic relatedness between the topic and vehicle concepts, in the two trope conditions. The more semantically related the topic and vehicle are, the more likely the relevant (to the topic) features of the vehicle concept are to be particularly salient features of that concept.

Therefore, as I have already discussed, as the topic and vehicle concepts are more semantically related in the hyperbole items than in the metaphor items, it is reasonable to conclude that there is likely to be a salience imbalance between the relevant features of the vehicle concept in the hyperbole and metaphor conditions. This could explain how the metaphor items, in which the relevant features of the vehicle concept are less salient, may take longer to process than the hyperbole items, in which the relevant features are more salient of that same vehicle concept.

Having said this, as already discussed in section 3.6, our word-naming findings go against Giora's Graded Salience account of novel metaphor processing. Therefore, our findings as a whole can be better explained by the concept construction accounts discussed, both of which can account for our findings from each of the experiments.

Summary

I have argued that the reading-time difference between metaphoric and hyperbolic statements, could, at least in part, be due to the topics in the literal and hyperbolic items being structurally/semantically far more related to the vehicle terms than in the metaphoric items. This idea is consistent with the Relevance Theoretic account, the Class-inclusion account, and the Graded Salience Hypothesis as the details of each of these accounts are such that the semantic relationship between the topic and vehicle would effect the processing of the metaphoric statement they are embedded in. The Structure-Mapping account on the other hand, does not appear to be able to explain the reading-time difference between metaphors and hyperboles without making some critical adaptations.

3.7.2 THE RICHNESS/COMPLEXITY OF METAPHORIC AND HYPERBOLIC INTERPRETATIONS

The theoretical framework on which the Relevance Theoretic (RT) accounts are based provides another possible explanation for the reading-time difference present in our data. According to Relevance Theory, Relevance is a 'cognitive principle', which guides the human cognitive system, and thus guides communication.

It follows from the *communicative principle of relevance* that a hearer is justified in expecting an utterance to be *optimally relevant "that it is relevant enough to be worth her processing effort, but also that it is the most relevant one compatible with the speaker's abilities and preferences"* (see Sperber and Wilson, 1995: 266-278; Wilson and Sperber, 2004: 612).

According to Relevance Theory, the act of ostensive communication alone automatically communicates this *'presumption of optimal relevance'*. A hearer is

driven to satisfy their expectation of 'relevance', and the more implicatures (intended inferences) derived, the more relevant an interpretation will be (provided there is a balance with processing effort).

The more implicatures an interpretation generates, the heavier the dependence on memory will be, since the context (previous conversation and surrounding linguistic material) must be recalled in order for the implicatures to be integrated into the discourse. Therefore, the more implicatures there are, the longer the interpretation process will take. Metaphoric interpretations are likely to yield many more inferences than equivalent literal statements, especially if the metaphoric statement is embedded within a rich context. Therefore, the richness of metaphoric interpretations could go some way towards explaining the longer reading times for metaphors over comparable literal statements. In addition, it might also be possible to appeal to this notion of 'richness of interpretation' to explain the reading time difference between metaphors and hyperboles.

It is possible that hyperbolic interpretations yield fewer implicatures than metaphoric interpretations. Although Ortony's (1979) Salience-imbalance account of metaphor comprehension has been found to be flawed in several ways (see section 1.4, and Glucksberg 2001 p.33-36 for full discussion) as a psychologically real account of how we process metaphor, it is not to say that this notion of salience-imbalance cannot be used to draw a distinction between metaphors and hyperboles. In both metaphors and hyperboles, the properties of the vehicle, which are attributed to the topic are more salient/characteristic of the vehicle than of the topic, therefore it is informative to attribute them to the topic and raise the hearer's awareness of these properties in the topic.

Moreover, when looking at the lists of topic-vehicle pairings in table 3, it becomes immediately apparent that this 'salience imbalance' is far greater in the metaphoric items than in the hyperbolic items. This means that the attribution of relevant properties from vehicle to topic in the metaphors would yield more cognitive effects than the same process in the case of the hyperboles. The more inferences derived, the longer the interpretation process takes, and hence the longer reading times for metaphors over hyperboles.

3.7.3 SUMMARY

I have argued that there are potentially two factors which could be contributing to this reading-time difference between metaphors on the one hand, and hyperboles and literal statements on the other; (1) the fact that the topic and vehicle concepts in metaphors are less semantically related than those in hyperboles and literal statements, and (2) metaphoric interpretations may be richer/more complex (yield more implicatures) than hyperbolic and literal interpretations.

3.8 SUMMARY OF ADULT FINDINGS IN RELATION TO CURRENT PRAGMATIC AND PSYCHOLOGICAL ACCOUNTS

We found that metaphors took significantly longer to read than comparable hyperboles and literal statements, suggesting that metaphors require additional processing effort than hyperboles and literal statements, either at the level of accessing and processing the linguistic representation via the lexicon, or further down the line, in deriving inferences.

Furthermore, we found that the derivation of metaphoric and hyperbolic interpretations completely dampens priming of the lexically encoded vehicle concept, which is tentatively suggestive of suppression taking place during the processing of both metaphoric and hyperbolic statements. This finding is backed up by our eye-tracking findings which suggest that early processing (the stage of accessing and processing the encoded content) of a target sentence is the same in a metaphoric and hyperbolic context; first-pass fixations on vehicles/target words (e.g. it was **noxious**) were significantly longer when preceded by a metaphor or hyperbole biasing context, than when preceded by a literal biasing context.

Any such evidence of the deactivation of the 'literal' meaning during novel metaphor comprehension is consistent with the processing models posited by the Relevance Theoretic account, the Class-inclusion account, and the Structure-Mapping account,

but difficult for the Graded Salience Hypothesis to explain, as it states that the literal meaning is not discarded during the comprehension of novel metaphors.

Our reading-time findings are not inconsistent with the broad outline of the unified Relevance Theoretic account, or any of the other accounts that suggest or entail that metaphor and hyperbole are processed in the same way. Our word naming findings suggest that the cause of the reading-time difference between metaphors and hyperboles, lies outside of the lexical access and activation regulation processes posited by these accounts. However, the onus is on each of these accounts to explain what other factors, consistent with the processing models they posit, might be contributing to the reading-time difference between metaphors and hyperboles.

I have argued that there are potentially two factors which could be contributing to the reading-time difference between metaphors and hyperboles; firstly, the fact that the topic and vehicle concepts in metaphors are less semantically related than those in hyperboles and literal statements, and secondly, that metaphoric interpretations may be richer/more complex than hyperbolic and literal interpretations.

The first of the contributing factors that I argue for can be accounted for by the Relevance Theoretic account, the Class-inclusion account, and the Graded Salience Hypothesis, as all of these accounts entail that the semantic relatedness of a topic and vehicle pairing will affect processing. The Structure-Mapping account on the other hand, does not appear to be able to explain the reading-time difference between metaphors and hyperboles without making some critical adaptations.

The second of the contributing factors that I argue for is motivated by the Relevance Theoretic framework, and as such, is not readily explainable by the other accounts, which a) do not discuss implicitly communicated content or its derivation and b) do not posit processing accounts in which a hearer is driven to satisfy their expectation of 'relevance' by deriving implications.

Since the empirical evidence from experiment 1 is consistent with all of the current accounts discussed in this thesis, but the findings from experiment 3 discredits the Graded Salience Hypothesis, on the basis of the data alone we are left with three viable accounts: The class-inclusion account, the Relevance theoretic accounts (perhaps more specifically, Carston and Wearing's adapted discontinuous version),

and the Structure-Mapping account. All are, on the whole, compatible with the data discussed in this work.

The concept construction accounts on the one hand, and the Structure –Mapping account on the other, fall on either side of the comparison/categorization debate, and in this respect the two camps are experimentally distinguishable. As I concluded at the end of chapter 2, the evidence exclusively in support of the two concept construction category assertion accounts (Relevance Theory and Class-inclusion) appears more robust than that put forward as evidence exclusively in support of the Structure-Mapping account (see chapter 2 for full discussion). Unfortunately, by and large the two concept construction accounts are indistinguishable experimentally; by this I mean that, given the state of the art, empirical facts compatible with one are likely to be compatible with the other.

Having said this, Relevance Theory provides a unified account of non-literal language, which explicitly predicts our findings that indicate that metaphor and hyperbole are processed via the same processes and mechanisms, whereas the Class-inclusion account is posited as an account of metaphor alone. Moreover, Relevance theory provides an account of figurative language interpretation which is embedded within a wider account of communication, and even more generally, human cognition. As such, it provides a justification of why processing might go the way it proposes. If human cognition is driven by the search for relevance, then communication will be driven by the search for relevance, and a hearer's interpretation will be the optimally relevant one, not the most literal one. As a psychological account of metaphor processing alone, the Class-inclusion account lacks this dimension.

In the final chapter, I will present findings from a developmental study in which young children's comprehension of metaphors and hyperboles is contrasted. The experiment reported is grounded in the theoretical issues outlined in the previous chapters, and may shed some new light on them (i.e. the role of suppression during figurative language interpretation will be further explored, and their ability to comprehend metaphors and hyperboles will be compared), but their prime focus is developmental: they try to uncover young children's figurative language comprehension capacities and why they differ from adults'.

4 CHILDREN'S UNDERSTANDING OF FIGURATIVE LANGUAGE

4.1 INTRODUCTION

General overview

This chapter is dedicated to the presentation of findings from two novel developmental experiments investigating young children's capacity to interpret novel metaphors and hyperboles. The overall aim of this thesis is to investigate the processes and mechanisms involved in arriving at novel metaphoric and hyperbolic interpretations, and in doing so, try to determine whether there might be something unique about metaphor due to the interpretation processes involved, or whether metaphoric interpretations are just a further broadening of the encoded meaning than hyperbolic interpretations. However, the aim of these developmental experiments is two fold. The first of our objectives is purely developmental: we try to uncover young children's figurative language comprehension capacities and why they differ from adults. We try to determine the age at which children understand figurative language and how this progresses through childhood. However, the experiments reported are also grounded in the theoretical issues outlined in the previous chapters, and may shed some new light on them. Firstly, the role of suppression during figurative language interpretation will be further explored by investigating a potential correlation between figurative language comprehension capacities and inhibition control. Secondly, children's ability to comprehend metaphors and hyperboles will be contrasted in order to further investigate potential processing differences between the two tropes.

The first of our experiments focuses on metaphor, and introduces a new paradigm looking at three age groups (3, 4 and 5 year-olds), while the second experiment directly contrasts metaphor and hyperbole with one age group. Both investigate the potential correlation between non-literal language comprehension and inhibition control.

Despite the different theoretical accounts of figurative language interpretation (see chapter 1 for full review), and the different processing predictions each of them make, one thing can be claimed for sure; some sort of pragmatic processes are involved in the derivation of non-literal interpretations. As Pouscoulous (2011:55) explains, *"no*

matter how one accounts for metaphor comprehension, it involves some type of pragmatic process, and context will therefore play an essential role in retrieving the intended meaning". Our developmental data presented in this chapter, taken with the existing literature, will give us some indication of the age at which children develop the necessary abilities to carry out these pragmatic processes, and thus, accurately interpret figuratively intended utterances.

These two experiments are the first to (a) show that children as young as three years-old can accurately interpret age appropriate metaphors despite the presence of a conflicting contextually inappropriate literal interpretation, (b) to contrast children's understanding of metaphor and hyperbole, and (c) the first to investigate a correlation between children's figurative language comprehension and inhibition control capacities. Our findings will a) contribute to the set of research detailing young children's abilities at interpreting figurative language, and b) provide us with a better understanding of the cognitive mechanisms and pragmatic comprehension procedures involved in figurative language comprehension.

Consistent with current theoretical accounts (see chapter 1 for full discussion), there are good reasons to believe that active suppression is involved in the comprehension of both metaphoric and hyperbolic statements, both based on our word naming findings (see section 3.3), as well as on previous findings (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Gold, Faust and Goldstein 2010; Peirce, Maclaren and Chiappe 2010). Moreover, other research indicates that inhibition control, a sub-capacity of our general executive function capacities, is the cognitive mechanism employed during active suppression.

We also know that inhibition control rapidly improves in children around the age of 4 (Gold et al. 2010; Monetta and Pell 2007; Papagno et al. 2003; Amanzio et al. 2007). If active suppression is required during the processing of figurative language, and the cognitive mechanisms responsible for suppression develop rapidly around the age of 4, then we are likely to see a marked improvement in metaphor comprehension at around the same age.

As with the adult literature, the vast majority of the developmental research investigating figurative language comprehension has focused solely on metaphor. There has been little, if any, studies which have investigated very young children's understanding of hyperbole, and none that have contrasted children's understanding of the two tropes; the findings from this study will go some way towards filling this gap. In contrast with current theories that either overtly propose or entail that metaphors and hyperboles of the form X is Y are processed in the same way (see chapter 1 for full review), our reading-time findings (see section 3.1) suggest that metaphors are more difficult and time-consuming to process than hyperboles, which are processed as quickly as literal statements. Depending on the cause of the additional processing effort during metaphor interpretation, we may find that young children are more able with respect to hyperbole comprehension than metaphor comprehension.

Previous developmental research

To date, developmental metaphor studies have had two main objectives: To reveal the age at which children develop the capacity to understand metaphor, and to reveal how their abilities improve with age. Findings indicate that children do not understand metaphor until quite late on in childhood. Some even suggest that children are well into their teens before they can properly understand metaphoric language.

As Pouscoulous (2011) argues, these findings are in stark contrast with a plethora of developmental research investigating children's other pragmatic abilities, which suggest that very young children have advanced pragmatic abilities (See Tomasello 2008 for a summary). In addition, (Tomasello 2003; Bloom 2000 or Clark 2003) suggests that these abilities are essential to language acquisition. In other words, competence in pragmatic inference is a prerequisite to language acquisition. So why is there a disparity between developmental research investigating metaphor comprehension, and those studies investigating children's competence on other pragmatic tasks?

Previous research investigating the metaphor comprehension capacities of children with a diagnosis of an Autistic Spectrum Disorder (ASD) has suggested that 'Theory of Mind' (TOM) is key to metaphor comprehension (Happé 1993), and we know that

young children (under the age of 4) typically fail standard false belief tasks. If non-literal language interpretation is in fact contingent on the ability to represent the mental states of others (Happé 1993; Sperber and Wilson 1995), then we would expect children below the age of 4 to be fairly unsuccessful at interpreting metaphors and other tropes.

Many of the early developmental metaphor studies (see below for discussion) appear to have methodological flaws, which serve to highlight factors that need to be controlled for if one is to ascertain at what age children develop the capacity to arrive at accurate metaphoric interpretations. Several studies have erroneously taken young children's inability to explain the meaning of an utterance as evidence of them not having understood that utterance. Moreover, some authors have interpreted the fact that young children are unable to correctly interpret metaphors that pertain to complex emotions with which they are not familiar as evidence for the fact that they cannot interpret all metaphors pertaining to psychological states. These conclusions do not follow from the evidence, as the experimental tasks were such that they were testing something other than metaphor interpretation (i.e. the ability to describe ones metaphoric interpretation and the ability to understand metaphors which pertain to completely unfamiliar emotions). Another limitation of previous developmental studies investigating children's understanding of metaphoric language is that they failed to acknowledge the importance of familiarity in metaphor processing (see section 2.1.2 for discussion of familiarity effects). Many studies did not distinguish between highly conventionalized, familiar and novel metaphors, which likely had unreported effects on their findings.

Subsequent research set about designing studies that could isolate some possible causal factors related to children's abilities, such as richer semantic knowledge, understanding of psychological states, verbal intelligence, linguistic competence, and the novelty or conventionality of metaphors. This bulk of research has been instrumental in chipping away at what it is that we mean when we talk of 'the development of figurative language comprehension capacities'.

Recent research (Pouscoulous and Tomasello 2011) has aimed to control for all of the above factors, by ensuring that metaphors used in experiments with very young children, only pertain to conceptual domains with which such young children are

familiar, and by ensuring that tasks and materials are simple, age appropriate, novel and entertaining. By controlling for these factors, they are better able to determine children's novel metaphor comprehension levels, and infer from the results, the age at which children develop the cognitive mechanisms that enable this kind of context dependent interpretation. In fact, in contrast with the bulk of previous findings, their findings suggest that children as young as 3 can understand simple, age appropriate metaphors. This suggests that 3 year-old children already have in place the cognitive mechanisms required, and the ability to follow the inferential procedures necessary to understand non-literal language. However, I argue that, due to the task used in this recent research, it is not clear that the 3 year-old participants had anything like a full understanding of the metaphors used. Our new paradigm used in the experiments reported in this chapter is such that in order to give an accurate response to the experimental task, the children must have derived at least an approximation of the intended meaning of the figurative items used.

Our developmental findings

By ascertaining a) the age at which children possess the ability to accurately interpret novel metaphors, and b) whether this age correlates with their progress in inhibition control, we will be able to shed light on the processes and mechanisms that underlie novel metaphor comprehension.

Moreover, by contrasting young children's understanding of novel metaphor and hyperbole, we will be able to determine whether our finding of a reading-time difference (see section 3.1) between novel metaphors and hyperboles translates into a disparity between children's capacity to interpret the two tropes (i.e. whether the additional processing effort required during metaphor interpretation means that young children have more difficulty interpreting metaphors than hyperboles).

Before presenting findings from our developmental experiments, I will review the previous literature investigating metaphor comprehension in children.

4.2 METAPHOR COMPREHENSION IN CHILDREN

The general consensus from extensive research carried out in the 60s, 70s and 80s was that pre-school children are unable to accurately interpret language non-literally (see Pouscoulous 2011 for overview, or Nippold 1988/1998 and Winner 1988/1997 for in-depth review).

Asch and Nerlove (1960) found that when questioned about the 'literal' and 'metaphoric' meaning of adjectives such as 'cold' 'hard' and 'sweet' (e.g. Are people cold? Do you know any people who are cold? How do you know they are cold?), children under the age of 6 only interpreted such polysemous adjectives 'literally' (e.g. people are cold because they do not have enough clothes on).

Winner, Rosenstiel and Gardner (1976) asked children to explain the meanings of metaphors; some described psychological states in physical terms, as in Asch and Nerlove (1960) (e.g. "After many years of working at the jail, the prison guard had become a hard rock that could not be moved"), and others described sensory experiences in terms of other sensory experiences (e.g. "her perfume was bright sunshine"). Again, they found that 3-6 year old children did not infer the non-literal meanings of these statements, and provided explanations such as "The perfume was bright yellow". The children's lack of alternative, metaphoric interpretation meant that they would even ignore the linguistic structure of the sentence, which was at odds with their literal interpretation (e.g. " when she was standing outside in the sun, she smelt of perfume").

Johnson (1982) also found that when asked to freely come up with their own interpretation of context-free metaphors (e.g. "My sister is a rock"), children under the age of 6 provided explanations such as " she is hard, like if you felt her hand, you couldn't squish it or anything", indicating that they had interpreted the metaphor vehicle literally.

All three of these studies found that it isn't until the age of 7-10 that children begin to arrive at metaphoric interpretations of such statements, although their interpretations were often inappropriate (e.g. describing a person described as a rock, as 'fussy'), and

it was only the 11 and 12 year old children in each of these studies, who appeared to accurately interpret the metaphoric statements.

These findings suggest that young children lack the cognitive capacities with which to carry out the relevant pragmatic processes required in order to accurately interpret figurative language. As Pouscoulous (in press) points out, this is puzzling, though, not least because of building evidence suggesting that, given the right experimental conditions, children as young as 3 or 4 years old appear to have the pragmatic ability to derive implicatures and understand presuppositions (Pouscoulous, Noveck, Politzer, and Bastide 2007; Katsos and Bishop 2011; Pouscoulous, Lieven, and Tomasello (in prep.); Berger and Höhle 2011), but also because there is plenty of evidence that suggests that young children could not learn to speak (i.e., understand and produce words as well as syntactic structures) without a plethora of pragmatic abilities (see, e.g., Tomasello 2003; Bloom 2000 or Clark 2003).

Recent findings suggest that under the right circumstances children are able to derive appropriate scalar implicatures. Papafragou and Musolino (2003) showed that children as young as five are able to produce scalar inferences (i.e. 'not all' from 'some') given the right training and experimental conditions. Firstly, before the experiment, children were told that a puppet would be talking and that he would "say silly things" and that the point of the game was to "help the puppet say it better" (e.g. they would be asked whether the puppet described a dog appropriately by saying "This is a little animal with 4 legs" or whether the puppet appropriately described a scene in which 'Mickey' put all of his hoops around a pole by saying "Mickey put some of the hoops around the pole"). The experimental paradigm was such that the focal point was on a protagonist's performance; which meant that children's expectations about the stronger case (*all*) were raised. In addition, children were given a little back story aimed to facilitate the derivation of scalar implicatures, i.e. they were told how the protagonist claimed to be especially good at the hoop throwing task. The specifics of this experimental paradigm meant that 5 year-olds appeared able to produce scalar implicatures, however, still less often than adults.

Pouscoulous, Noveck, Politzer, and Bastide (2007) found that when the experimental paradigm is designed to reduce cognitive effort, children as young as 4 years old can

successfully derive scalar implicatures. Four, 5 and 7-year-olds, as well as adults indicated a pragmatic understanding of '*some' (*68%, 73%, 83% and 86% of the time, respectively). Furthermore, unlike Papafragou and Musolino's (2003) study Pouscoulous et al.'s (2007) study shows that the youngest children (4 and 5 year-olds) can draw scalar implicatures without any previous training, again, provided the experiment is not too costly with respect to processing effort. Interestingly though, it is still the case that even in a task which strongly encourages scalar implicatures to be drawn, younger children are less likely to draw them than older children and adults, which is suggestive of a developmental trajectory with respect to the ability to derive scalar implicatures. More recently, Katsos and Bishop (2011) have replicated these findings with 4 year olds.

Moreover, there is some evidence to suggest that children as young as 3 or 4 can draw presuppositional inferences. Berger and Höhle (2011) used a design adapted from Papafragou and Tantalou (2004) to investigate whether 3 and 4 year-olds could consider the 'presuppositional import' of '*auch'(too)*. Children saw toy animals attempting to accomplish two tasks each. The child was allowed to reward the toys, if, and only if, they had finished both their tasks. For example, a lion had to eat an apple and a banana. In answer to the experimenter's questions about whether he had eaten the banana, the lion would respond with an utterance either with, or without, the particle *auch* – i.e. "I've eaten the apple or "I've eaten the apple, too". Children from both age groups consistently rewarded the toy characters in the '*auch'* condition. However, they rewarded the toy significantly less often in the condition without the particle. This finding suggests that pre-schoolers are able to consider the presupposition triggered by '*auch'* when the experimental design is more child-friendly.

Similarly, Pouscoulous, Lieven, and Tomasello (in prep.) used a novel act-out paradigm to investigate young children's presuppositional abilities. They found that 3 year-olds were above chance at taking into account the presuppositions carried by both '*auch'* and '*nochmal' (again)*, while 2;6 year-olds responded randomly. As Pouscoulous et al. conclude, it remains unclear whether the poor performance of 2;6-year-olds is due to a genuine incapacity to interpret the presupposition linked to '*auch'*, or whether the task was still too complex for such young children, but

together, the findings on children‘s presuppositional abilities seem to match those on scalar implicature.

Recent findings suggest that given the right experimental conditions, children are able to derive complex pragmatic inferences given the right conditions. This raises the question as to whether, young children’s apparent failings with respect to metaphor comprehension might be linked to the experimental paradigms used, and whether, given the right conditions, children might be capable of making the pragmatic inferences necessary to interpret utterances non-literally.

The developmental metaphor studies mentioned above did not fully account for why young children might have difficulty interpreting metaphors. Do they lack the required cognitive capacities and inferential abilities or did previous studies include potentially impeding factors? Did the metaphors they used pertain to world knowledge that was beyond that of a 6 year old? Were the tasks easy enough for such a young child to carry out? We know that children are poor at expressing themselves at this age, and the tasks used rely upon this skill.

The next section is dedicated to the discussion of several potentially impeding factors relating to previous developmental research investigating metaphor.

4.2.1 FACTORS AFFECTING COMPREHENSION

Several factors (world knowledge; context; task difficulty; familiarity; Theory of Mind abilities) have been found to contribute to young children’s difficulties with non-literal language comprehension.

World knowledge

A number of studies have concluded that children’s poor performance on metaphor tasks may be the result of limited and patchy world knowledge (Gentner 1988; Evans and Gamble 1988; Dent 1984; Keil 1986. See Winner 1988 for full discussion). Lack of detailed knowledge and understanding of many conceptual domains could mean that children are not able to perceive similarities or make connections between those

domains. Children's conceptual knowledge is often very sensory focused. For example, they know that clouds are fluffy, but they may not know that they are made up of water vapor, and that they are the cause of rain. This means that they could more easily interpret the metaphor "the cloud was a pillow" than the metaphor "his worries were a cloud above his head". (Winner 1988)

Evans and Gamble's (1988) findings illustrate that in order to interpret a metaphor accurately, it is critical to have at ones' disposal, a detailed encyclopaedic knowledge of the topic and vehicle domains. They used age appropriate materials when testing children (aged 8-12) on their ability to interpret metaphors, in order to ensure that children would not fail to interpret the metaphors due to lack of appropriate world knowledge. Children were asked to identify the important features of a list of topic vehicle terms, which had been taken from a series of metaphors. Six weeks later, the children were asked to explain what each of the metaphors meant. Performance improved with each age group, but more importantly, children were found to misinterpret the metaphors when they also listed incorrect or irrelevant features for the topic or vehicle. This suggests that children are not necessarily failing because of their lack of pragmatic ability, but because of their lack of semantic knowledge.

Other studies suggest that the type of encyclopaedic information that a metaphor pertains to, can affect whether or not a child will be able to accurately interpret it (Gentner 1988; Nippold, Leonard and Kail 1984; Waggoner and Palermo 1989).

Gentner (1988) illustrated that younger children found metaphors based on relational similarities (e.g., 'A cloud is a sponge') harder to understand than metaphors based on attribute similarities (e.g., 'The sun is an orange'). Moreover, Cicone, Gardner and Winner's (1981) findings indicated that young pre-school children find it difficult to interpret metaphors which pertain to psychological states. On the other hand, Cicone et al.'s findings were contradicted by Nippold, Leonard, and Kail (1984), who found that 7 year-old children performed just as well at comprehending psychological metaphors, as they did at other types of metaphor.

However, Waggoner and Palermo (1989) have subsequently criticised Nippold et al's (1984) methodology as they used a 'forced choice' task, in which the children were

asked to choose which, out of two interpretations, was the correct interpretation of a given metaphor. The choice was mostly between the correct 'psychological' interpretation and another incorrect non-psychological interpretation (e.g. The choice for " Joey was a vacuum cleaner listening to the story" was either the correct psychological interpretation that he was listening very hard and taking it all in, or the non-psychological incorrect interpretation in which he was sitting in a big chair). Waggoner and Palermo (1989) point out that this contrasting forced choice task does not require the child to have made any particular inference with regard to the intended meaning of the metaphor; i.e. in what way could his behaviour or mental state be likened to a vacuum cleaner. All that is required of them is to determine that the metaphors referred to something psychological.

Even if we do interpret Nippold et al's (1984) findings as indicating that 7 year old children can infer that a non-literal interpretation is intended, and that the metaphor is describing a psychological state, Cicone at al's (1981) findings suggest that as soon as children of the same age, and slightly younger, are asked to discriminate between different psychological states, their performance is much worse. Moreover, an alternative interpretation of Nippold and colleagues' findings is that the child is simply going for the most likely scenario in the given context, without understanding anything about the metaphor.

Waggoner and Palermo (1989) suspected that young children might do well at interpreting psychological metaphors, if it is ensured that the metaphors used, only pertain to psychological states with which children of that age are familiar (e.g. 'Betty is a bouncing bubble' in the context of a story in which Betty is extremely happy). Previous research had suggested that children as young as 5 can understand 'emotion terms' e.g. love, happiness, anger, fear and sorrow (Bretherton et al. 1986; Stein and Levine 1987; Trabasso et al. 1981). They constructed metaphors using only these emotion terms. They again used a forced choice task, to avoid failures due to an inability to explain the meaning. However, unlike the Nippold et al. (1981) study, the choice was between two different emotions, therefore answering correctly required the child to have understood the metaphor to be pertaining to one emotion rather than another. In the first experiment the ambiguity was between two polarised emotions (e.g. Love- Hate, Happy- Sad etc.), and in experiment 2, the ambiguity was between

two emotions at one end of the spectrum (e.g. Pride-Love, Happy-Love or Anger-Fear, Anger-Sorrow).

They found that although 5 year-old children performed significantly above chance, they were just attending to the polarity of the metaphor and the emotions contrasted in the Love-Hate, Happy-Sad contrasts. The only ambiguity they had constructed which required the children to contrast two negative emotions, was the Anger-Fear contrast. The 5 year-old children struggled with this distinction and often interpreted anger metaphors as describing fear. On reflection Waggoner and Palermo proposed that this may have been because many of the stories had things in them, which could be frightening the younger children (sinking ships and stinging bees), and therefore fear was the overriding emotion for them when they heard the stories. Overall, their findings indicated that by the age of 7, children were able to grasp more than just metaphoric polarity, although their performance was far from adult levels. By the age of 9, children were as good at understanding the anger-fear metaphors as they were at any other emotion contrast.

Gibbs (1990; 1992) claims that pre-existing conceptual mappings in long-term memory are used during metaphor comprehension. Therefore, we might expect children to find metaphor comprehension more difficult than adults, who have more life experience, on the basis of which they may have mentally represented mappings between domains. Although a child may exhibit signs of 'knowing' a category or 'being familiar' with a domain, they may not have the experience on which to construct mappings between those categories (e.g. although they know the category 'ballerina' enough that they know that ballerinas dance to music and that they are pretty, would they have seen enough ballet to know enough about the sorts of moves they make, to construct a mapping between the concept BALLERINA and LEAVES BLOWING IN THE WIND). If they haven't then according to Gibbs, that child may find it more difficult to comprehend the metaphor 'the leaf was a ballerina dancing in the garden' than an adult who may well have such a mapping between domains.

Dent (1984) investigated young children's ability to draw comparisons between familiar domains. Five year-old children were asked to pick out pairs (map between domains); firstly, literal pairs such as two ballerinas dancing in different ways and then metaphorical pairs such as a spinning top and a spinning ballerina. After

identifying the pairs, the children were asked to explain the 'ground' (what they had in common). Even the 5 year-olds had some success at pairing metaphorically, provided that they had enough conceptual knowledge of the objects to make metaphorical pairings (mappings), but as expected, performance improved with age.

Moreover, Keil (1986) found that five year-old children's metaphor comprehension abilities appear to emerge in an "all or nothing" type way within conceptual domains. If they understood one metaphor within a conceptual domain, they were likely to understand the other metaphors within that conceptual domain, and vice versa. The children showed a basic understanding of several different metaphors involving the car/animate distinction (e.g. the car is dead) but they were not able to correctly interpret the metaphors about ideas or books (e.g. the idea bloomed). Presumably, their knowledge and understanding of ideas and the content of books is too limited for the children to make the link between that domain, and the domain of plants and flowers. Without this mapping, children fail to accurately interpret any metaphors that are dependent on that mapping. These findings support Gibbs' notion of stable metaphorical mappings being used during the comprehension of related metaphors. Once a metaphorical mapping has been made between two domains, children are able to comprehend new metaphors that pertain to the same mapping.

In summary, the findings discussed in this sub-section suggest that the development of metaphor comprehension capacities positively correlates with their acquisition of conceptual domain knowledge, and that once a metaphorical mapping between two domains is understood, children are readily able to interpret new metaphors pertaining to that same mapping.

Although there may be a point at which children develop the cognitive mechanisms which enable them to comprehend metaphors, their ability to comprehend a wide repertoire of metaphors is still contingent on them having the relevant world knowledge.

Context

It is clear that little or no supporting context can make metaphor comprehension more difficult (Vosniadou et al. 1984), but likewise, placing metaphors in too rich or complex a context (see section 3.1) is likely to cause additional processing effort,

especially for children. Moreover, it has been established (Reynolds and Wilson 1984) that the degree to which the metaphor 'fits' within the narrative of the context, affects processing.

Many previous studies have presented children with metaphors with no supporting context, which must clearly impede their comprehension, as a linguistic context from which to draw relevant inferences is critical.

Our adult reading-time findings (see section 3.1) illustrate that metaphors take longer to read when preceded by a long context, suggesting that even for adults, a rich and complex context requires more integration, and thus more processing effort. It is likely that this effect would be even greater for children, who are likely to find the processing, storing and recalling of information more challenging than adults. However, Vosniadou (1989) argues that children's lack of conceptual/semantic knowledge leads them to be more reliant on context than adults.

Reynolds and Wilson (1984) found that children understand metaphors better if they express a predictable outcome of the narrative in the previous context. For example, if Billy had stolen some cookies and was about to be caught by his mother, the metaphor a) "Billy was a squirrel burying his nuts" was easier to understand (he hid the cookies), even by preschoolers than the metaphor b) "Billy was a squirrel heading for his tree" (ran to his room), as the metaphor in a) is a more probable outcome of the narrative than the metaphor in b).

Task difficulty

In order to ensure that success or failure on a given task is indicative of a child's metaphor comprehension capacity, it is critical to ensure that they are not failing the task because it calls upon cognitive resources that are underdeveloped in young children. This was found to be the case with studies investigating 'scalar implicature' understanding in young children (Pouscoulous et al. 2007). They argued that children have less cognitive resources to use on making pragmatic inferences and that this will have an impact on their performance at complex tasks.

Many of the tasks used in previous studies investigating children's understanding of metaphor, require the child to explain the meaning of the metaphors, or to make a truth value judgment about them. Therefore, as Pouscoulous (2011) discusses, these studies have not ruled out the possibility that children do poorly on these tasks, not because they lack the capability to accurately interpret the metaphors, but because they lack the ability to articulate and express themselves. The tasks used rely on children's metalinguistic abilities rather than their understanding of the metaphor itself.

Understanding what is meant by a metaphor and explaining one's interpretation of that metaphor are two quite separate skills, and the two should not be confounded. Indeed, studies (Waggoner and Palermo 1989) using simple paradigms which avoid metalinguistic tasks such as explaining, describing or verifying, suggest that children may be much better at comprehending metaphoric language than earlier studies have led us to believe.

In fact, as well as implementing the forced-choice task (in which 5 year olds performed significantly above chance), Waggoner and Palermo (1989) also asked children to explain their choice. Five year olds were unable to do this, 7 year olds were also poor at explanation, and 9 year olds were just beginning to show signs of being able to explain the metaphoric meaning. The poor performance for all age groups on the explanation task relative to the forced-choice task illustrates that children's poor performance in many studies using expressive tasks could well be because they are unable to articulate themselves properly, rather than because they lack the ability to interpret metaphors.

Pearson's (1990) elicited repetition task provides further support for this hypothesis. Based on the assumption that it is harder to repeat back nonsense sentences than sentences we can make meaning out of, Children were asked to repeat back metaphorical ('the stars are the moon's children'), literal (' the fog comes in after the rain storm'), and anomalous ('newspapers are stars wearing the bath') sentences. Three year olds and five year olds were far better at repeating metaphorical and literal sentences, than they were at repeating anomalous ones, indicating that they are getting some interpretation out of the metaphors.

Familiarity

As discussed in section 2.1.2, many metaphor studies have found evidence of familiarity effects in metaphor processing in adults (Blank, 1988; Blasko & Connine, 1993; Camac & Glucksberg, 1984; Gildea & Glucksberg, 1983; Glucksberg, Gildea, & Bookin, 1982; Martin, 1992). Furthermore, it has been argued that qualitatively different comprehension processes underlie novel and conventionalised metaphor (Glucksberg 2001; Wilson and Carston 2007:26; Bowdle and Gentner 2005; Gibbs 1990). It seems therefore important for developmental studies investigating early metaphor comprehension to differentiate between idioms, conventionalised metaphors, and novel metaphors. However, many of the studies discussed above, did not make this distinction.

As Pouscoulous (2011) illustrates, idioms and novel metaphors lie at opposite ends of a familiarity spectrum. In fact, it is thought that idioms are stored in the lexicon as one long semantic constituent, and retrieved as such (Swinney and Cutler 1979). The meaning of key, individual words or compounds within an idiom can be unknown to a hearer who understands and uses the idiom as a whole perfectly accurately (e.g. the word 'squib' in the idiom ' it was a damp squib', or the compound 'dead-ringer' in the idiom 'she/he is a dead ringer for….'). Novel metaphors, however, are thought to be context-dependent and occasion specific (Wilson and Carston 2007; Glucksberg and Keysar 1990; Glucksberg 2001; Gentner 1983; Wolff and Gentner 2011). An occasion-specific, non-literal interpretation is inferred on-line, based on the contextually relevant features of the encoded meaning. Across the middle of the spectrum, lie cases of metaphor which vary according to degree of familiarity, with highly conventionalised metaphors such as 'she/he was an angel', or 'he/she was a pig' at one end, and 'he/she was feral' being relatively novel at the other end.

As Pouscoulous (2011) argues, the different processes and mechanisms underlying idioms and novel metaphors mean that the abilities required in order to interpret the two phenomena most likely have very different models of acquisition. The meanings of new idioms are likely to be learned case-by-case, and stored and retrieved like any new lexical item. If a child is not frequently exposed to a given idiom in context, they will not know its meaning.

I argue that many conventionalised metaphor vehicles (e.g. 'pig', 'witch', 'dragon') will most likely encode two meanings from a very early age through constant exposure to such terms in a metaphoric context. In such cases, the intended meaning would be arrived at through a process of disambiguation (meaning selection) in context. In fact, for many young children, it is highly probable that certain conventionalised metaphor vehicles will encode only the 'metaphoric' meaning of the word (e.g. Angel or Heaven). They may only acquire the 'literal' meaning a little later on in childhood. In these cases, as with idioms, no disambiguation or meaning construction would be required for interpretation; the single encoded meaning would suffice. Other conventionalized metaphors likely start out as novel metaphors, the meaning of which they have to construct on-line in a first instance, before the word becomes used quite frequently in the conventional figurative meaning, and might then start to behave like a polysemous term. Vega Moreno (2007) experimentally investigated children's comprehension of familiar/conventionalized metaphors in contrast with properly lexicalized metaphors, and presents evidence suggesting that children develop 'pragmatic routines' for dealing with metaphors which are familiar or conventionalized in their speech community, but are not properly lexicalized.

In contrast, the meaning of a novel metaphor must be constructed on-line, using world knowledge, the encoded content, and the surrounding context. Rather than being learned, the cognitive capacities required in order to make this kind of inference must develop in early childhood. Once developed, they will equip the child to construct an on-line, occasion specific interpretation of any metaphor, regardless of whether they have ever heard it before.

Even though interpretations of both conventionalised and novel metaphors must be inferred based on the given context, there is still good reason to believe that novel metaphor interpretation may require more processing effort and be more cognitively challenging than conventionalised metaphor interpretation. Our word naming findings (see section 3.3), together with previous sentence verification and lexical priming data, tentatively suggest that the interpretation of both novel and conventionalised metaphors (and hyperboles) involves the suppression of context irrelevant meanings/features associated with the lexically encoded content (Gernsbacher,

Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Peirce, Maclaren and Chiappe 2010).

However, based on her findings, Rubio-Fernandez (2007) suggests that the kind of attentional, active suppression involved in novel metaphor interpretation is qualitatively different from the more automatic suppression process, which takes place during disambiguation. Rubio-Fernandez argues that suppression during disambiguation is much more automatic than during novel metaphor comprehension because the appropriate meaning is there from the start; it just needs to be selected, while inappropriate meanings are inhibited. Whereas during novel metaphor comprehension, the alternative non-literal interpretation only becomes available later on in the process and so greater demand is placed on attentional processes (i.e. executive functions).

Findings suggest that children under the age of 4 have underdeveloped inhibition control capacities (Diamond & Taylor 1996; Frye et al 1995; Gerstadt, Hong & Diamond 1994; Jerger, Martin & Pirozzolo 1988; Kochanska et al. 1996; Livesey & Morgan 1991; Reed, Pien & Rothbart 1984, see section 5.1.4 for full discussion). Inhibition control is the attentional cognitive capacity that is employed when automatic inhibition or suppression fails. It is therefore, reasonable to predict that children under the age of 4 might have difficulty suppressing the 'literal meaning' of a novel metaphor, and consequently, might interpret such metaphors literally. This hypothesis, and the relationship between inhibition control and figurative language comprehension are discussed in detail in section 2.1.4.

Since many of the studies discussed in this review, fail to draw this distinction between novel and conventionalised metaphors, it is perhaps no surprise that there is a certain amount of inconsistency in the overall findings. If the objective of future research is to ascertain at what stage in development children are capable of constructing novel interpretations of utterances which are intended non-literally, then those studies must be certain that the stimuli are in fact novel metaphors. The only studies to date that have achieved this are Pouscoulous and Tomasello's (2011) study, and the experiments reported in this chapter. It is important to note that the study of idiom understanding in children and conventional metaphors is also interesting, but it does not tackle the same questions as the study of novel metaphor comprehension in

children, i.e. young children's capacity to construct novel interpretations of novel metaphoric statements.

Theory of Mind

Happé's (1993) findings led to the, originally at least, widely accepted belief that a fully developed 'Theory of Mind' (ToM) is required in order to arrive at 'non-literal' interpretations. This belief provided an explanation of why young children (under the age of 4) and individuals on the Autistic Spectrum appear to have difficulty comprehending metaphors. Both populations fail 'false belief tasks' (e.g. The Sally-Anne task (Winner and Perner 1983), which were taken to be indicative of whether or not an individual has a (1st order) ToM (Gopnik and Meltzoff 1997; Gopnik and Wellman 1994; Perner 1991; Wellman and Gelman 1998; Bartsch and Wellman 1995; Baron-Cohen, Leslie and Frith 1985; Winner and Perner 1983).

ToM can be summarized as 'the ability to attribute beliefs, desires and intentions to others'. Happe's (1993) findings indicate that impaired ToM is one of the causes of general pragmatic impairment.

Relevance Theorists Sperber and Wilson (1986/95) argue that "communication exploits the well-known ability of humans to attribute intentions to each other" (p. 699). Therefore, according to Relevance Theory (Sperber and Wilson 1986/95), individuals who have impaired theory of mind, and who as a result cannot attribute beliefs and intentions to other people proficiently, will have difficulty with comprehending ostensive-inferential communication.

The cognitive principle of relevance entails that human cognitive processes and mechanisms attend to information that is relevant (see section 1.6.1). Moreover, it follows from the communicative principle of relevance (see section 1.6.1), and the definition of optimal relevance (Sperber and Wilson 1986/1995, 266-78), that by addressing someone, a speaker communicates that his or her utterance is relevant (at least relevant enough to be worth the hearer's processing effort).

These principles laid out by Relevance Theorists form the foundations of an inferential theory of communication. Speakers' utterances carry with them a presumption of optimal relevance, and hearer's use this presumption to infer the speakers' intended meaning in a given context. The Relevance Theoretic

comprehension procedure entails that in order to infer the speaker's meaning, the hearer must mentally represent the mental representation(s) of the speaker; a hearer must 'metarepresent' the speaker's intention(s).

Sperber (1994) discusses three different levels of sophistication with respect to 'expectations of relevance': 'naïve optimism', 'cautious optimism', and sophisticated understanding.

Sperber argues that a naïvely optimistic hearer assumes that the speaker is both competent and benevolent: competent enough to avoid misunderstanding, and benevolent enough not to lead him/her astray. (Sperber 1994)

Suppose a mother utters " I need to go to the bank" as the mother and child rush along the high street after school. The most accessible interpretation of this utterance which is relevant enough in the given context is that the mother needs to go to the finance establishment on the high street. If this was her intended meaning then she is speaking competently and benevolently; the most relevant interpretation is the intended interpretation. The child need not represent his mother's thoughts/intentions in order to arrive at her intended meaning.

" the only time [a naively optimistic hearer] needs to metarepresent the speaker's thoughts is when, having found an acceptable interpretation, he concludes that it is the intended one."

(Wilson 1999:13)

A cautiously optimistic hearer, on the other hand, must do an extra layer of metarepresenting. A cautious optimist assumes that a hearer is acting benevolently, but not that they are necessarily competent. Rather than just assuming that the most accessible interpretation, which is relevant enough is the intended one, the hearer considers what the speaker might have thought to be the most accessible relevant-enough interpretation. This extra layer of metarepresentation allows the hearer to avoid misunderstanding where a naïve optimist wouldn't (e.g. when an interpretation is accidentally relevant – the most accessible interpretation that satisfies the hearer's expectations of relevance is not the one the speaker had in mind or when an interpretation is accidentally irrelevant – when a speaker accidentally tells something to a hearer, which they already know).

The final strategy, which Sperber labeled 'sophisticated understanding', is when a hearer does not assume that a speaker is always benevolent. A sophisticated understander is able to identify a speaker's intended meaning, even if he knows she is lying, by determining under what interpretation the speaker might have thought he would think her utterance was relevant enough. The hearer is able to represent the speaker's thoughts about the hearer's thoughts.

"A Naively Optimistic hearer need not metarepresent the speaker's thoughts at all in identifying the speaker's meaning……A Cautiously Optimistic hearer considers what interpretation the speaker might have thought would be relevant enough: at the cost of an extra layer of metarepresentation, he can cope with cases where the speaker tries to be relevant enough, but fails. Finally, a hearer using the strategy of Sophisticated Understanding considers what interpretation the speaker might have thought he would think was relevant enough; at the cost of a further layer of metarepresentation, he can cope with deceptive cases in which nothing more than the appearance of relevance is attempted or achieved." (Wilson 1999:14)

Sperber's strategies have been found to correlate with (social and communication) developmental milestones. The move from Naive Optimism to Cautious Optimism (the ability to recognize that X is mutually manifest) roughly coincides with the acquisition of first-order ToM, and the move from Cautious Optimism to Sophisticated Understanding (the ability to recognize that the speaker intends to make X mutually manifest) roughly coincides with the acquisition of second-order ToM (Bezuidenhout and Sroda 1996; Wilson 1999).

A simile (e.g. my brother is like a lion) can be interpreted (at least in a basic sense) by a naïve optimist, and thus, Happé (1993) argues, an individual without a ToM is readily able to interpret similes. However, Happé argues that in order to arrive at even an approximation of a metaphoric (e.g. my brother is a lion) interpretation some representing of a speaker's intentions is required. The hearer must at least understand what the speaker might have thought to be the most relevant interpretation, and therefore they must have at least 1st order ToM.

If metaphor interpretation requires first order ToM, and children under the age of 4 typically fail traditional false belief tasks (Winner and Perner 1983), suggesting that they lack first order ToM, then this could go some way towards explaining why children under 4 would have difficulty interpreting metaphors.

However, there is some debate about whether individuals who fail traditional false belief tasks, such as the Sally-Anne task (Winner and Perner 1983), really lack first order ToM. Pouscoulous (in press) illustrates that pre-verbal children and even 9-18 month-old infants have been shown to attribute intentions to others (Meltzoff 1995; Behne, Carpenter, and Tomasello 2005a), and consider information in the common ground, when interpreting a communicative act. Some such studies suggest that young toddlers can recognise communicative intentions (Behne, Carpenter, and Tomasello 2005b), and that they care about their own communicative intention being recognized, rather than just being pre-occupied with obtaining the object that they asked for (Shwe and Markman 1997). Moreover, 14- and 18-month-old infants have been shown to consider information shared with their interlocutor when interpreting an ambiguous communicative pointing gesture (Moll, Richter, Carpenter, and Tomasello 2008; Liebal, Behne, Carpenter, and Tomasello 2009).

Happé 1993

Happé tested the predictions of the Relevance Theoretic account by testing individuals with a diagnosis of autism (since individuals on the autistic spectrum generally fail false belief tasks, indicating that they have impaired Theory of Mind, and therefore, impaired pragmatic inference abilities) on their comprehension of metaphors vs. similes. She found that individuals (aged between 9 and 28) who failed false belief tasks (with a diagnosis of Autism) were significantly poorer at understanding metaphor, than those with 1st or 2nd order ToM, but they were no worse at understanding similes. Happé interpreted her results to be supportive of the Relevance Theoretic (1986/95) claim that metaphor comprehension requires 1st order ToM.

However, there may be alternative explanations for Happé's finding. Reynolds and Ortony (1980) argue that children find similes easier to interpret than metaphors because similes have a syntactic clue that there is a comparison to be made ('is like'). Furthermore, Norbury (2005) attempted to illustrate that semantic competence and language competence affect performance on metaphor comprehension tasks, while also being closely connected to performance of false-belief tasks, and that this could explain Happé's findings.

Norbury 2005

Norbury tested children with autism and/or language impairment on their understanding of metaphors and similes, with the aim of illustrating that ToM is not sufficient for metaphor comprehension. She found that linguistic ability affects metaphor comprehension. She found that children with language impairment (both with or without a diagnosis of Autism) had more difficulty with metaphor comprehension than children with an autistic spectrum diagnosis only. In addition, children passing the 1st order ToM task were more successful at metaphor comprehension than those who did not pass the 1st order ToM task. Finally, on further analysis, broad semantic knowledge, measured by the Test of World Knowledge (ToWK), was found to be a predictor of a significant amount of variance in metaphor comprehension, where as ToM performance was not.

Norbury's (2005) results suggest that ToM is necessary but not sufficient in explaining variance in metaphor comprehension. Norbury argues that it would be reasonable to assume that recognising the speaker's intention may make the metaphor comprehension task easier in natural contexts, but that her findings suggest that it is not sufficient to ensure that the individual can comprehend metaphors.

In summary, Happé's (1993) study indicates that Theory of Mind is a necessary prerequisite for metaphor comprehension. Although Norbury's (2005) findings did not rule out the possibility that ToM is a necessary prerequisite for metaphor comprehension, it did suggest that ToM is not sufficient to enable accurate metaphor comprehension; linguistic competence and semantic knowledge are also causal factors, which impinge on performance.

Happé (1993) and Norbury's (2005) findings suggest that children below the age of 4, who typically fail standard false-belief tasks, should find metaphor comprehension difficult. However, Pouscoulous and Tomasello's (2011) findings (see section 4.2.1) suggest otherwise.

The first of the experiments reported in this chapter directly contrasts 3, 4, and 5 year-olds' figurative language comprehension abilities, allowing us to further investigate this apparent 4 year-old watershed.

Summary

The above discussion illustrates that there are a number of factors, which potentially affect our ability to accurately interpret metaphoric language; some of which are perhaps not fundamental to figurative language comprehension, but can nevertheless affect comprehension. If experiments fail to control for these factors in developmental studies investigating children's comprehension of figurative language, we are not able to properly ascertain at what stage in development children are able to draw non-literal inferences, and perhaps more importantly, what cognitive prerequisites there are to drawing such inferences.

World knowledge and verbal intelligence develop slowly throughout childhood, which is why, if they play a dominant role in a metaphor comprehension task, very young children appear as unable to comprehend metaphors, and even adolescents have room for improvement.

Pouscoulous (2011) argues that it is probable that children have the cognitive means to understand metaphor as early as when they begin to speak, but that their limited vocabulary and knowledge of the world hampers their ability to do so. In the next section, I will discuss Pouscoulous and Tomasello's recent study in which they have attempted to boil metaphor down to its essence, and shed their experimental stimuli of the impeding factors detailed in this section.

4.2.2 VERY EARLY METAPHOR COMPREHENSION

Pouscoulous and Tomasello (2011) is the first study to have controlled for most of the confounding factors discussed above. Three-year-olds were asked to pass the experimenter one of two objects referred to by a novel metaphor (e.g. 'give me the bug with a jacket' or 'give me the car with the backpack'). The correct choice would be the object which could accurately be described using the relevant metaphor (e.g. a ladybird with big wings or a car with a roof box), rather than the other object, which although having its own unique feature (e.g. a car with no roof box, but with an identical box/parcel inside the car), could not be described using that metaphor.

In the metaphor condition, the correct object was chosen 73% of the time, which suggests that provided the metaphor materials pertain to child familiar conceptual domains, and the task is simple and independent of verbal intelligence, children as young as 3 can understand completely novel metaphors. The authors conclude that the ability to understand non-literal language seems to be in place from the earliest testable age. This finding casts doubt over the relationship between standard false belief tasks and metaphor comprehension since 3 year olds typically fail the standard false belief-tasks (see above for discussion).

Are they really metaphors?

Pouscoulous and Tomasello's (2011) conclusions about children's metaphor comprehension capacities are far more optimistic than previous analyses of metaphor production in very young children (See Pouscoulous 2011 for full discussion). Cases of spontaneous metaphor production in young children (e.g. calling a chimney a house-hat, calling a moving toy car a snake (Winner, McCarthy, Kleinman & Gardner 1979), calling a man's shaved head a kiwi (Pouscoulous, 2011), calling oneself a porcupine when coming out of the bath with wet hair (Pouscoulous, 2011) have mostly been reinterpreted as instances of overextension or pretense, rather than metaphor production.

This is an issue that could be leveled at Pouscoulous and Tomasello in relation to their interpretation of their findings. Could it not be the case that the children are interpreting the metaphors as instances of pretense? It is possible that the children were able to choose the correct object because they were able to pretend that the bug's wings were a jacket, or that the car roof box was a backpack, rather than appreciating the intended meaning (i.e. the bug's wings cover their body in the same way a jacket covers a person's body, or the car's roof box is like a backpack because it sits on the car's 'back' and allows it to carry things). Pouscoulous and Tomasello's findings cannot be indicative of over-extension, though, because all subjects were tested on their understanding and production of the literal meanings (e.g. a backpack), and on their comprehension and production of the intended metaphorical meaning (e.g. a car

roof box). In general, children did not overextend the meanings of the literal terms to include the objects described metaphorically.

It is not possible for Pouscoulous and Tomasello to rule out the pretense interpretation of their data, but Pouscoulous (2011) does argue that although the pretense hypothesis might be a reasonable way to interpret some examples of early metaphor production, there are some which cannot be instances of overextension or pretense (e.g. pointing at an elevator from below and saying 'we can see the elevator's buttocks'). Pouscoulous claims that it is clear that in these cases, the children know that they are not using the 'literal' label for these objects. Moreover, she points out that in many of these cases, the children were reportedly giggling or 'display[ing] obvious impishness' when uttering such examples, further suggesting that they know that they are not using the conventional term. Pouscoulous uses a final example (calling a plastic shape a butterfly and then saying 'in fact it is a flower, but it flew away, that's why I called it a butterfly') to illustrate that at least this 3.5-year-old girl clearly knew that she was not using the conventional label, as she was able to describe what it was about the plastic shape that made her want to describe it as a butterfly.

Pouscoulous concedes that some instances of child metaphor production may well be cases of pretense, but rather than concluding that these instances say nothing about metaphor production capacities in young children, Pouscoulous highlights potential connections between the two.

Pouscoulous points out that the ambiguity between metaphor production and pretense in young children serves to highlight the similarity between the two phenomena. Evidence suggests that children as young as 18 months can engage in pretend play (Leslie 1987, 1994), and that toddlers are capable of keeping fact apart from fiction (Rakoczy & Tomasello 2006), meaning that they clearly have the cognitive means to do so. Although the capacities required to intentionally produce a metaphor might be different, it is likely that there is some overlap, or that one phenomenon piggy-backs on the other. In fact, both behaviours may be manifestations of the same cognitive capacities.

Despite key differences between metaphoric comparisons and pretense, Pouscoulous (2011) emphasizes that there are undeniable similarities between the two phenomena, which have been acknowledged by metaphor theorists (Walton 1993; Grice 1989; Sperber and Wilson 1986, among others). Both involve some sort of analogy or property attribution process. The similarities serve to raise a question, though: why would young children be so good at pretense long before they show signs of capability with respect to metaphor interpretation?

Pouscoulous (2011) argues that metaphor understanding is simply more difficult to demonstrate in very young children, because their language skills are underdeveloped. Finding evidence of metaphor understanding below the age of 3 seems unlikely as children don't have enough vocabulary.

Evidence suggests that children as young as 18 months are starting to show signs of engaging in pretend play, so if, as Pouscoulous argues, pretense and metaphor exploit some or all the same cognitive capacities, then we should not rule out the possibility that, at least as soon as they are verbal, children have the capacity to produce and understand metaphor.

Another possible criticism which could be leveled at Pouscoulous and Tomasello (2011) is that it is possible that children are not understanding the metaphor, but are simply using some 'association' strategy to choose the correct object. When asked to pass the car with a backpack, the child might choose the car with a box/parcel on its roof instead of the car with a box/parcel inside the car, because the box/parcel on the roof is more associated with a backpack. Below I will discuss how the novel paradigm used in the experiments reported in this chapter, avoids this potential criticism.

The new picture selection paradigm used in our developmental experiments reported in this chapter (see section 4.3), goes some way towards ruling out a pretence interpretation of our data, as well as an 'association strategy' interpretation. Children were read a series of short stories ending in novel metaphoric (and hyperbolic) statements, and for each story the child was required to choose which of three pictures (placed in front of them) went together with the story. The use of illustrations depicting an entire scene (see figure 1 below), together with the context described in the story (e.g. This weekend, Stephen is going on a day trip in his car. They have had

to stop because Stephen's car has got a bad foot) makes it less feasible that the experimenter, or the individual or object in the picture is pretending.

Figure.1 Illustrations for one of the metaphoric stories in our developmental experiment

Control picture

Literal picture

Metaphoric picture

Like Pouscoulous and Tomasello's (2011) study, our paradigm also controls for all the factors, which may impede children's performance (i.e. world knowledge; context length; task difficulty; familiarity). We made sure to use words that are known to the particular age groups – and very familiar to them. We used very short, child friendly contexts corresponding to situations they would be used to, and with words we made sure they could understand. We piloted extensively to ensure that the task was simple enough, and didn't require more attention than even the youngest age group could contribute (see section 4.3.1 for full discussion).

Moreover, and perhaps most importantly, the new paradigm introduces a third, potentially interfering choice for the child. Where Pouscoulous and Tomasello's design presented the child with two objects to choose from, this new three-way picture selection paradigm includes a third picture, depicting, somewhere in it, the lexically encoded meaning of the metaphor vehicle (e.g a bad foot). This picture means that in order to accurately interpret the metaphor, and pick the correct picture, the child must resist the temptation to interpret the vehicle literally (resisting this temptation has been shown to be difficult for individuals with poor IC (Papagno et al. 2003), and realize, based on the surrounding discourse and linguistic context (e.g. it is the car that has a bad foot, not a person) that the statement is intended non-literally, and decide which of the other two pictures depicts the intended metaphorical meaning (i.e. whether one would describe a car with a missing door, or a car with a missing wheel, as having a bad foot). This task is intended to mimic the processes taking place

during metaphor interpretation (i.e. the hearer must use the linguistic and discourse context in order to infer the intended meaning of an utterance).

Due to the addition of the conflicting literal choice, it is not possible for children to use some sort of 'association strategy' to choose the correct 'figurative picture'. If they were to use an association strategy, they would choose the literal picture.

4.2.3 CONTRASTING WITH OTHER TROPES

As mentioned above, like adult research, the majority of developmental research investigating figurative language has focused on metaphor (and to some degree, irony). To my knowledge there has been little, if any, research investigating very young children's understanding of hyperbole, using up to date, child friendly experimental paradigms, and none that have contrasted children's understanding of metaphor and hyperbole.

Some studies have investigated the understanding of hyperbolic irony in the context of naturalistic positive and negative family conversations in the home (Recchia, Howe, Ross and Alexander 2010), but this is not comparable to controlled experimental conditions. Moreover, these studies are perhaps indicative of an assumption in the developmental psychology literature that has likely led to the lack of research specifically focusing on tropes other than metaphor and irony; as Wilson (2012) argues, in recent experimental literature the notion of irony has been broadened to include a whole range of phenomena (rhetorical questions, teasing, banter) including hyperbole. While hyperbole has been considered to be a form of irony, possible differences between the developmental trajectories of regular irony (*e.g. 'Isn't John's shirt lovely' - said of a man wearing a clearly awful shirt*) and hyperbole, for example, have not been properly explored. Some studies have investigated children's understanding of irony in controlled experimental conditions, and have generally found that irony comprehension develops considerably later than other pragmatic phenomena, such as scalar implicature (Pouscoulous et al., 2007; Kastos & Bishop, 2011), or even metaphor, according to recent findings (Pouscoulous and Tomasello 2011). Typically, irony comprehension appears to develop between

the ages of five and six, when the ability to pass standard second-order false belief tasks has just emerged (Dewes et al. 1996, Happe 1993, Winner, 1988; Capelli et al., 1990; Creusere, 1999, 2000; Keenan and Quigley, 1999; Nakassis and Snedeker, 2002; Pexman and Glenwright, 2007). However, as Wilson (2012) points out, the breadth of the notion of irony used in much of this experimental literature (see Leggitt and Gibbs' (2000:5-6) breakdown in d. below) means that, although the findings provide valuable insights into the nature and development of the cognitive mechanisms that allow us to understand echoic/attributive uses[28], they provide little insight into the developmental trajectory of what Wilson (2012) argues to be several distinct mechanisms.

d) ''various forms of irony'':

> Irony. ''The speaker's observation of a contradictory state of affairs, but not directly critical of the addressee.''
>
> Sarcasm: ''A statement that clearly contradicts the knowable state of affairs, and is harshly critical toward the addressee.''
>
> Hyperbole/ Overstatement: ''A description of the state of affairs in obviously exaggerated terms.''
>
> Understatement: ''A description of a state of affairs as clearly less important than it appeared in context.''
>
> Satire: ''A statement that appears to support the addressee, yet the speaker actually disagrees and mocks the addressee.''
>
> Rhetorical question: A question that is obviously false in a given context
>
> (Leggit and Gibbs 2000:5-6)

[28] Echoic use is a technical term in relevance theory (Sperber and Wilson, 1995: chapter 4, sections 7--10; Wilson, 2006; Wilson and Sperber, 2012). An echoic account of irony claims that an ironical utterance is used to express the speaker's own dissociative (e.g. mocking, scornful or contemptuous) attitude to a thought similar in content to the one expressed in her utterance, which she attributes to some source other than herself at the current time.

Wilson (2012) rightly argues that, although it is clear that irony and hyperbole can combine, as in (e), hyperbole is not inherently ironical, and therefore, the comprehension of hyperbolic utterances requires distinct mechanism(s) from those required to accurately interpret regular ironic utterances.

e) *I am going to have to put my bikini on in a minute, it is so hot in here (said in an extremely cold room)*

As discussed in chapter 1, Relevance theorists treat hyperbole as a type of broadening of the linguistically encoded content, closely related to metaphor (Wilson and Carston, 2007; Sperber and Wilson, 2008), "which does not involve the expression of a characteristic attitude or tone of voice, and combines as easily with non-echoic forms of parody as with irony" (Wilson 2012:15). Wilson (2012) welcomes developmental studies focusing specifically on hyperbole as they could provide valuable insights into how cognitive mechanisms relevant to hyperbole comprehension develop, and would also contribute to the construction of an adequate account of hyperbole. These are precisely the objective of the second developmental experiment reported in this chapter.

In addition to those developmental studies already discussed, young typically and atypically developing children's understanding of metaphor and metonymy (e.g. Tim is the sweets) have been investigated and directly contrasted using some up-to-date paradigms, yielding some interesting findings (Nerlich, Todd and Clarke 1999; Rundblad and Annaz 2010). Nerlich et al.'s (1999) metonymy findings were comparable to previous metaphor findings as they showed that children's understanding of metonymies improved with age. Moreover, Rundblad and Annaz (2010) showed that children with a social-communication disorder such as Autism, are severely impaired with respect to both metaphor and metonymy comprehension, suggesting that the pragmatic processes and/or cognitive mechanisms underlying metaphor are the same or similar to those underlying metaphor. These findings illustrate that it is important to contrast children's understanding of different tropes in order to determine whether it is something specific about metaphor that can cause problems for young children, or whether their problems can be generalizable to all figurative meanings.

In contrast with the current theories discussed in this thesis, which either overtly propose or entail that metaphors and hyperboles of the form X is Y are processed in the same way (see Chapter 1 for full review), our reading-time findings (see section 3.1) suggest that metaphors are more difficult and time-consuming to process than hyperboles, which are processed as quickly as literal statements. Depending on the cause of the additional processing effort during metaphor interpretation, we may find that young children are more able with respect to hyperbole comprehension than metaphor comprehension.

Our second developmental experiment presented in this chapter, allow us to directly contrast young children's (3 year olds) understanding of metaphor and hyperbole, which means that our findings together with the adult findings presented in chapter 3, will allow us to assess whether the unified aspect (which is either explicit or implicit) of current accounts is accurate, and whether findings relating to metaphor can be generalized to hyperbole.

One last aspect that is potentially crucial for the interpretation of figurative language and a difference between metaphor and hyperbole is executive function; and that is one other factor our experiments in this chapter will focus on. Following a discussion of Executive Functions and the connection between these attention and suppression capacities and figurative language comprehension capacities, I will present our developmental experiment and our findings.

4.2.4 INHIBITION CONTROL AND FIGURATIVE LANGUAGE

Executive functions and inhibition control

'Executive functions' is an umbrella category which denotes those processes that serve to "monitor and control thought and action, including self-regulation, planning, behavior organization, cognitive flexibility, error detection and correction, response inhibition, and resistance to interference". (Eslinger 1996; Zelazo, Carter, Reznick, & Frye, 1997).

Inhibitory control (IC) (the ability to maintain attention on

responses/representations/information in order to achieve a given goal, while inhibiting responses/representations/information that may interfere with achieving said goal) and working memory are basic executive functions that make it possible for more complex executive functions like problem-solving to develop (Senn, Espy and Kaufmann 2004), and are among the earliest executive functions to appear, with initial signs observed in infants, 7 to 12 months old (Luca, Cinzia, Leventer, Richard 2008; Anderson 2002).

IC allows us to inhibit responses to irrelevant stimuli while working towards a cognitively represented objective (Rothbart & Posner 1985), which is a situation that can be created for testing purposes by designing a task which requires the participant to concentrate as much on an interfering action schema, as on the desired action schema.

A classic example of an IC test (for adults) is 'the colour-word interference test' (Delis et al. 2001) when subjects are presented with 'colour words' such as 'blue' or 'red', but written in a different colour ink than the colour they depict (red or blue). Participants are asked to name the colour of the ink and not name the word itself. This task requires the subject to inhibit their reading capacity, which is highly activated when presented with written words in their own language. Another common test used to determine IC capacity is the Wisconsin card sorting test (Heaton, Chelune, Talley, Kay and Curtiss 1997), in which participants are asked to sort stimulus cards according to colour, shape, or number. This requires the subject to suppress their capacity to recognize colour and shape when sorting cards according to number, for example.

The role of inhibition control in figurative language comprehension

A discussed in detail in chapter 2 (section 2.1.4), previous evidence, together with our word-naming findings (presented in chapter 3) tentatively suggest that novel metaphor (and hyperbole) interpretation involves the active suppression/inhibition of metaphor irrelevant features (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Gold, Faust and Goldstein 2010; Papagno et al. 2003; Peirce, Maclaren and Chiappe 2010).

Furthermore, other empirical findings suggest that it is our IC capacities that are employed during metaphor comprehension, in order to carry out such activation regulation of relevant/irrelevant features (Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold and Faust 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007). Metaphor relevant information must be attended to, while ensuring that information which is irrelevant to, or inconsistent with a metaphoric interpretation does not interfere with processing (see section 2.4 for full discussion).

These findings fit with most of the current theoretical accounts (with the exception of the Graded Salience Hypothesis) discussed at the beginning of this thesis. Glucksberg and colleagues (Glucksberg and Keysar 1990; Glucksberg 2001) claim that the suppression of metaphor irrelevant features of the basic-level features takes place during metaphor comprehension. Structure-mapping theory states that hearers must keep active relational correspondences between the vehicle and the topic, while suppressing surface differences (Clement and Gentner 1991; Wolff and Gentner 2011). Relevance theorists propose a 'dropping' process, in which content constitutive features of the encoded vehicle concept are 'dropped' or 'demoted' during interpretation (Carston 2002; Wilson and Carston 2007).

If figurative language comprehension requires active suppression (or at the very least, attention regulation), as our word-naming findings, and others findings tentatively suggest, and IC is the cognitive capacity responsible for attention maintenance and inhibition (Eslinger 1996; Zelazo, Carter, Reznick, & Frye, 1997), then the development of good inhibition control must be a pre-requisite to understanding figurative language (as suggested by previous findings: Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold and Faust 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007). In order to assess the strength of this hypothesis, it is essential to test young children on both their IC capacity, and their figurative language comprehension capacity, which was an important element of both of our developmental studies reported in the next section.

Children's development of executive function

Children reach important milestones in their development of IC between birth and 6 years of age, but they show signs of rapid improvement at around the age of four, at a similar time to when they pass the false belief task (Diamond & Taylor 1996; Frye et al 1995; Gerstadt, Hong & Diamond 1994; Jerger, Martin & Pirozzolo 1988; Kochanska et al. 1996; Livesey & Morgan 1991; Reed, Pien & Rothbart 1984). Sudden development of IC is thought to contribute to various cognitive developmental changes, which take place at around this time in childhood, including general intelligence, attention, memory, as well as reading comprehension (Carlson and Moses 2001).

A number of age appropriate tests have been used to assess young children's inhibition control capacity. These tests broadly fall in to one of two categories; the first of which measures children's ability to delay or completely suppress an impulse response to a stimuli when a task so requires it (e.g. to not look while an exciting present is being noisily wrapped; Kochanska et al. 1996). The second type of test requires the child to respond in a specific way despite a highly salient, alternative and conflicting response (e.g. to touch the green card when the experimenter says 'snow', or to touch the white card when the experimenter says 'grass'; Carlson and Moses 2001). Children's performance on these tasks continues to improve throughout the pre-school period, with children performing at ceiling by the age of 5 or 6.

This behavioural data patterns nicely with neurological data showing significant brain maturation in the areas of the brain thought to be responsible for IC (frontal lobe) between the ages of 4 and 7 (Luria 1973; Thatcher 1992). In addition, findings suggest that frontal lobe lesions in children, result in lack of IC (Dennis 1991).

A strong correlation has been found between ToM and inhibition control (Carlson 1997; Carlson and Moses 2001; Davis and Pratt 1995; Frye, Zelazo, and Palfai 1995; Gordon and Olsen 1998; Hughes 1998; Hughes et al. 1999; Perner and Lang 1999). Some theories propose that there is a functional dependency between the development of inhibition control and ToM, and some accounts suggest, in different ways, that inhibition control and ToM are two parts of the same process and/or that they are both mediated by the same brain region (See Perner and Lang 1999 for full discussion).

Summary

If children do not develop good IC until around the age of 4 or 5, as findings suggest (Diamond & Taylor 1996; Frye et al 1995; Gerstadt, Hong & Diamond 1994; Jerger, Martin & Pirozzolo 1988; Kochanska et al. 1996; Livesey & Morgan 1991; Reed, Pien & Rothbart 1984), and IC plays a role in figurative language comprehension, as findings suggest (Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold and Faust 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007), then we would be justified in predicting that children younger than 4 years old will have difficulties with metaphor and hyperbole comprehension.

One of the aims of our experiments discussed below was to test the above prediction. To my knowledge, these are the first developmental experiments to investigate the relationship between inhibition control and figurative language comprehension. We will compare children's performance on tasks probing their understanding of metaphor and hyperbole with their performance on typical executive function tests.

4.3 DEVELOPMENTAL STUDY CONTRASTING YOUNG CHILDREN'S COMPREHENSION OF METAPHOR AND HYPERBOLE

We carried out two developmental experiments assessing children's ability to understand novel metaphors and hyperboles. In the first experiment, 3-to-5-year-old children were read a series of short stories, each ending in a novel metaphoric statement (e.g. Emily was a hedgehog). Following this, the child was asked to pick which out of three pictures showed what happened in the story. In the second experiment, the exact same paradigm was used with a group of 3 year-olds, but this time metaphor and hyperbole were directly compared: in addition to the novel metaphoric stories, children were required to make a picture selection for a series of novel hyperbolic stories. In both experiments, children were also tested on their IC capacity using two age appropriate IC tasks taken from Carlson and Moses (2001), in order to determine the presence of a correlation between IC and figurative language comprehension.

The first experiment was designed to test whether children as young as 3 can accurately interpret age appropriate novel metaphors, provided that the items pertain to conceptual domains, which are familiar to pre-school children. A picture-selection paradigm (inspired by the act-out task used in Pouscoulous and Tomasello 2011) was used in both experiments rather than a task involving toys in order to make a pretense interpretation of the data less feasible, but it was ensured through pre-testing that the demands of the task were not too great for children of this age. In addition, following Pouscoulous and Tomasello's lead, all the figurative statements used in our experiments were novel, so as to ensure that we were in fact measuring children's ability to carry out the inferential processes required in order to construct an accurate novel metaphor interpretation, rather than their lexical knowledge of conventional metaphors.

One of the aims of our experiments discussed below was to test the prediction that children under 4 will find novel figurative language comprehension harder than those over 4 because of the rapid improvement in IC capacity around that 4 year-old watershed (see section 4.1.4). To my knowledge, these are the first developmental experiment to investigate the relationship between inhibition control and figurative language comprehension.

With this aim in mind, as well as testing the children on their IC capacity using standard IC tasks, (unlike any previous study investigating very young children's understanding of figurative language) an attempt was also made to ensure that passing the metaphor and hyperbole tasks required the child to suppress the impulsive response to interpret the vehicle literally. It is not the first time that an object or picture selection paradigm has been used in a developmental study investigating metaphor comprehension, but this is the first time children have been presented with three pictures to choose from, rather than the standard two-choice (control and correct) paradigm.

The third picture depicted somewhere in it, the lexically encoded meaning of the metaphor vehicle (e.g for the metaphor *'the car has a bad foot',* a bad foot appears in the third 'conflicting literal' picture). Thus, in order to accurately interpret the metaphor, and pick the correct picture, the child must resist the temptation to interpret the vehicle literally (as described in many studies Gibbs 1994; Nippold 1988/1998

and Winner 1988/1997 for reviews), and realize, based on the surrounding discourse and linguistic context (e.g. it is the car that has a bad foot, not a person) that the statement is intended non-literally. This presents an advantage as it enable us to present more fine-tuned findings about whether the younger age groups of children truly understand metaphor or simply react with some kind of association strategy (as could be said of Pouscoulous and Tomasello's (2011) findings).

If children frequently choose the 'literal' picture then this would be suggestive of an interference effect from the availability of the literal interpretation of the metaphor/hyperbole vehicle, potentially due to underdeveloped IC. Indeed, Papagno et al. (2003) (see section 2.1.4) showed that Alzheimer's patients found it difficult to arrive at the correct interpretation if there was a particularly salient but inconsistent/inaccurate literal interpretation available to them, suggesting that patients' known difficulties with inhibition control were affecting their ability to suppress the literal interpretation.

If the children are able to inhibit the literal interpretation of the metaphor/hyperbole vehicle then they will able to reject the third picture, and decide which of the other two pictures depicts the intended metaphorical meaning (e.g. whether one would describe a car with a missing door, or a car with a missing wheel, as having a bad foot). This task is intended to mimic the processes taking place during metaphor interpretation (i.e. the hearer must use the linguistic and discourse context in order to infer the intended meaning of an utterance).

The paradigm was the same for both experiments; however the first experiment compared three different age groups (age 3, 4, and 5 years), whereas the second experiment focused in on just 3 year-olds. Moreover, where the first experiment focused on metaphors, the second experiment incorporated both metaphor and hyperbole in order to allow us to directly contrast children's understanding of the two tropes. This is the first time metaphor and hyperbole have been contrasted in a developmental study, using an up-to-date, child friendly experimental paradigm. As discussed above, in contrast with most current accounts of figurative language (Wilson and Carston 2007; Glucksberg and Keysar 1990; Glucksberg 2001; Clements and Gentner 1991; Wolff and Gentner 2011) our reading-time findings (see section 3.1) suggest that metaphors are more difficult and time-consuming to process than

hyperboles, which are processed as quickly as literal statements. Depending on the cause of the additional processing effort during metaphor interpretation, we may find that young children are more able with respect to hyperbole comprehension than metaphor comprehension.

It is reasonable to infer from our word-naming findings, which suggest that lexically encoded vehicle meanings are equally deactivated after arriving at metaphoric and hyperbolic interpretations, that our inhibitory control mechanisms are no more involved in metaphor comprehension than they are in hyperbole comprehension. If the observed deactivation of lexically encoded content is the result of suppression, then IC mechanisms will have been equally employed during the interpretation of both metaphoric and hyperbolic statements during our word-naming task. Finding a difference between children's performance on the metaphor and hyperbole tasks with respect to the degree to which their performance can be predicted by their performance on the IC tasks would suggest that IC might be more critical during the interpretation of one trope (e.g. metaphor) than it is during the interpretation of the other (e.g. hyperbole) e.g. inhibitory mechanisms may be necessarily required during the interpretation of metaphors, whereas they may just be beneficial during the interpretation of hyperboles. If this were the case, children with poor IC would, of course, find metaphor comprehension more difficult than hyperbole comprehension.

4.3.1 EXPERIMENT 1

Three, four, and five year-old children were tested on their ability to accurately interpret novel, age appropriate metaphors. Moreover, a potential relationship between children's metaphor comprehension capacity and their inhibition control capacity was explored, as children's inhibition control capacities were also tested. If the deactivation of the lexically encoded content of metaphor vehicles during novel metaphor interpretation (which can be observed in both our word-naming data (see chapter 3) and others' lexical priming (Rubio-Fernandez 2007) and sentence verification data (Gernsbacher et al. 2001) is the result of active suppression, as these findings tentatively suggest, then we would expect to find a correlation between

children's IC capacity and their capacity to accurately interpret age appropriate novel metaphors.

METHOD

Participants

Fifty monolingual, English speaking children aged between 3;0 and 5;11 years were recruited from two South-London nurseries. There were three groups; the first group contained sixteen children (7 boys and 9 girls) aged between 3;0 and 3;11 (mean age 3;6), the second group contained fourteen children (7 boys and 7 girls) aged between 4;0 and 4;11 (mean age 4;4) and the third group contained twenty children (11 boys and 9 girls) aged between 5;0 and 5;11 (mean age 5;6) In addition, 10 UCL undergraduate students aged between 18 and 25 made up a small adult control group.

The age groups were chosen on the basis of the rapid improvement in Inhibition Control at 4 years old. The three age groups enabled us to assess children's performance on the experimental tasks before, at, and after that 4 year-old watershed.

Metaphor task materials

All the materials were constructed specifically for children aged as young as 3. Parents of 3 year-old children were consulted on their opinion of how well their child understood the relevant vocabulary. In addition, nine metaphor items were piloted on eleven 3 and 4 year-old children to a) ensure that children of this age had full command of the relevant vocabulary, and b) to determine whether the children were able to interpret the intended meanings. Based on the pilot results, 6 metaphor items were chosen for the experiment. Three were not chosen because of issues with the vocabulary which made them inadequate for children to understand.

Based on previous findings in relation to the effects of context on children's understanding of metaphor (Vosniadou et al. 1984; Reynolds and Wilson 1984), we endeavored to make the short stories as brief as possible so as not to overload the child with information, while ensuring that the brief narrative within the stories still supported the intended interpretation. Furthermore, we ensured that the child could

not choose the correct picture based on the context alone (i.e. there was nothing in the story, apart from the final metaphoric statement, which would rule out either the literal or control picture).

Table 1. Metaphor experimental items

	Stories
Metaphor 1	It's Sunday afternoon, and Alex is playing outside in the fresh air. Today, Alex is a monkey. Can you find the picture in which Alex is a monkey?
Metaphor 2	This weekend, Harry is going on holiday with his Daddy. Harry's car has a backpack. Can you find the picture in which the car has a backpack?
Metaphor 3	This weekend, Stephen is going on holiday in his car. They have had to stop because Stephen's car has got a bad foot. Can you find the picture in which the car has a bad foot?
Metaphor 4	It's Saturday night, and Katy is playing with her toys before bed-time. Katy is a zebra playing with her toys. Can you find the picture in which Katy is a zebra?
Metaphor 5	This weekend, Emily is staying at her granny's house. Emily has had a bath and now she is a hedgehog. Can you find the picture in which Emily is a hedgehog?
Metaphor 6	It's Saturday, and Archie is going to a party. Archie is ready to leave for the party and he has a bush on his head. Can you find the picture in which Archie has a bush on his head?

Procedure

Each child was presented with 4 tasks; a metaphor picture-selection task, two inhibition control tasks, and a word naming and pointing task (to ascertain whether the child had a good grasp of the vocabulary necessary for the metaphor picture selection task).

The picture-selection task was piloted on a group of 11 children aged between 3 and 5 to ensure that they were appropriate for children of this age. All 11 children completed the picture-selection task, and their performance on the literal practice trials indicated that they fully understood the task, and were able to pick the correct picture provided the language used was literal.

The inhibition control tasks were taken from Carlson and Moses (2001), and the word-naming and pointing task was taken from Pouscoulous and Tomasello (2011) (adapted to be relevant to our metaphor items) and were, therefore, known to be appropriate for young children (they do not involve advanced linguistic abilities or knowledge that children of this age might lack). However, they were also included in our 11 piloting sessions, as we wanted to ensure that children as young as three were comfortable completing all 4 tasks sequentially (amounting to a 20 minute testing session).

We found that all of the children in our pilot group were capable of completing all four tasks in a row, and maintaining concentration on each task.

The metaphor picture selection task

The children were shown a picture book with some short stories. First, the children were read an introductory story on the first page of the picture book, about a class of children who are all friends at school. Then they were told that the rest of the picture book is about what each of the children in the class are doing at the weekend. The experimenter explained the following; "Let's look at what each of the children are doing at the weekend!", "Oh no, all the pictures have gone missing from the picture book, and have become all jumbled up! If we read each of the stories, can you help me find the right picture to go with each story?" (pointing at a pile of jumbled up pictures).

Then, the children were read the stories, one at a time. Each story ended in a sentence that should be interpreted metaphorically in the given context (e.g. It's Saturday night, and Katy is playing with her toys before bed-time. **Katy is a zebra playing with her toys**.). There were 6 metaphoric stories in the metaphor picture selection task (see table 1 above).

After each story, children were asked to select which picture from a selection of 3 pictures (see materials and counterbalancing below), which were placed in front of them, they thought showed what was happening in the story. There was a space for the child to stick the chosen picture below the story in the picture book.

It was ensured that the three pictures from which the child could choose were as similar as possible, but that they differed in just one respect. One picture depicted an accurate figurative interpretation of the story (i.e. a car with a broken wheel), and the other two pictures depicted an inaccurate interpretation given the context.

Figure.2 shows the correct, metaphoric picture for the metaphor 'the car has a bad foot'.

Figure. 2 Correct metaphoric picture for the metaphor item 3 '*the car has a bad foot'*

A second 'control' picture depicted a nearly identical image to the first one, except that in this image, there was always nothing relating to the figurative interpretation, but something else was depicted (e.g. in this case, the car door has fallen off), as illustrated in figure.3.

Figure . 3 Control picture for metaphor item 3 '*the car has a bad foot'*

Finally, a third 'literal conflicting' image was again, almost exactly the same as the other two pictures, but this time, somewhere in the image, there was a conflicting literal interpretation of the metaphor vehicle (e.g. a bad foot). See figure.4 below.

Figure. 4 Conflicting literal picture for metaphor item 2 '*the car has a bad foot'*.

As mentioned in the introduction, the three-choice picture selection paradigm is such that in order to choose the correct picture, the child must suppress the literal interpretation of the trope vehicle (i.e. not select the 'literal' picture on the basis of interpreting the vehicle literally), but also that the child arrives at (at least) an approximation of the intended meaning of the figurative statement.

If the child picks the correct (metaphoric) picture, then they must have (at least approximately) interpreted the item accurately. The three pictures were always almost identical, and only differed with respect to one or two features (e.g. the car wheel or door falling off, or the broken leg in the background). If the child chose the correct picture, then they had rejected the literal picture (depicting a literal interpretation of the metaphor vehicle), indicating that they understood that the vehicle was not being used 'literally'. Moreover, they had rejected the control picture, which like the correct and literal pictures, always depicted an event relevant to or coherent with the story (e.g. a car having stopped at the side of the road), but depicted some other possible salient feature or characteristic (e.g. a door having fallen off) which could not be accurately described using the metaphor (e.g. '*the car has a bad foot'*). See appendix B for all items and illustrations.

It was ensured that all three pictures were equally exciting, salient, colourful, and interesting for all items (e.g. that the one small difference between the three pictures did not cause one of the pictures to be more interesting to children than the others), as such differences may have skewed the results. This was verified during piloting.

In addition to the experimental items, there were 3 practice trials. The practice items followed exactly the same format as the experimental items, but all were literal; there was a short story (e.g. This weekend, Sally is at the park. She is having lots of fun riding on her bike in the park. Can you find the picture of sally riding her bike in the park?), followed by a choice of three pictures, one of which was an accurate representation of the story, the other two were not (see figure.5 for an example).

Figure.5 Practice trial 3 pictures

Correct

Incorrect

Incorrect

Inhibition control tasks (Carlson and Moses (2001)

1 – Snow grass task: The child is showed two cards, a green one and a white one. The child is asked to point to the green card when I say "*snow*", and to the white card when I say *"grass"*. They are asked to do this several times. Children's responses were only recorded after they had responded correctly several times.

2- Bear/unicorn task: The child is introduced to two hand puppets – *'the nasty bear'* and the *'nice unicorn'*. They are told that the bear is not nice and therefore we must not do as he says. We must ignore everything that he tells us to do, but the nice unicorn is very nice and so we must always listen to him carefully and do exactly what he says. Then, the experimenter, using the bear and unicorn puppet, and putting on a mean and friendly voice respectively, asks the child to do a series of actions such as *"tap your head"* or *"touch your nose"*, or *"close your eyes"*. Again, children's responses were only recorded after they had responded correctly several times.

Naming and pointing vocabulary task

At the end of testing, as in Pouscoulous and Tomasello (2011), the children were given a naming-and-pointing game with a picture book designed specifically for this experiment, to determine their comprehension and production of the vocabulary used in the metaphor task.

Firstly, the child was asked to name a series of objects/scenes in a picture book, which were pointed out by an experimenter ("*what is this?*"). This was to ensure that they could produce a label for all of the metaphor vehicles in the experimental tasks (e.g. *Hedgehog; bad foot; backpack*), and that they did not 'over extend', and use a 'figurative' label to refer to something which should literally be described in different

terms (e.g. to ensure that they didn't use the word 'monkey' to refer to a little boy hanging in a tree). This is important to establish, as if the child is 'over-extending' the term *'monkey'* to include little boys hanging in trees, then they are, potentially at least, not interpreting the term non-literally. Instead, they may be interpreting it literally, according to their understanding of its literal denotation.

Secondly, the child was required to point out objects/scenes named by the experimenter out of a number of objects on one page in a picture book (e.g. *"Can you point to the monkey?"* or *" Can you point to the hedgehog?"*). Again, some of the pictures depicted the metaphor vehicles used in the experiment, and some depicted the scenes described in the metaphoric stories (e.g. '*a little boy hanging from a tree*', or '*a person with spiky hair'*).

The picture book consisted of 12 pages (6 for naming, and 6 for pointing). Each page corresponded to one of the metaphor items. The first 6 pages had four pictures on each page; one of the literal interpretation of the metaphor vehicle (e.g. *a monkey*), one of the figurative interpretation of the story (e.g. *a little boy hanging from a tree*), one of an unrelated object or event (e.g. *a shoe*), and one of an unknown object. For each of the objects on these first 6 pages, the child was asked *"what is this?"* and the child was expected to produce a label for the object. Pages 7-12 had three pictures on each page; one of the literal interpretation of the metaphor or hyperbole vehicle (a different image from that used in the naming section of the picture book); one of the figurative interpretation of the story (again, a different image from that used in the naming section), and finally, an unrelated object or event. For each of the objects on these pages (6-12), the child was asked "*can you point to the [ ]?",* and the child was expected to point to the correct object.

It was ensured that the whole procedure took no longer than 15 minutes per child. Small play breaks were taken if a particular child became tired or distracted, but generally, the tasks were delivered quickly in order to hold the child's attention.

Counterbalancing

The metaphor stories were presented in a random order for each participant. Random orders were generated using 'Random.org'. In addition, the position of the three pictures was counterbalanced (between right, left and middle) across participants

using a Latin square (see below). This means that there were 6 lists for picture position (c= control, l = conflicting literal picture, f= correct figurative picture).

Table. 2 Latin square for counterbalancing

	List 1	List 2	List 3	List 4	List 5	List 6
1	c l f	l c f	l f c	c f l	f l c	f c l
2	f l c	c l f	c f l	l c f	f c l	l f c
3	l f c	f l c	c l f	f c l	l c f	c f l
4	l c f	l f c	f c l	f l c	c f l	c l f
5	c f l	f c l	l c f	l f c	c l f	f l c
6	f c l	c f l	f l c	c l f	l f c	l c f

The grass/snow tasks and bear/unicorn tasks were in a fixed order – each child saw the grass/snow task first, followed by the bear/unicorn task.

The IC tasks were always presented after the metaphor picture book, and the vocabulary naming and pointing task was always presented last, to ensure it would have no carry-on effect on the metaphor task.

Coding

Children's responses to all 4 tasks were hand recorded by a second experimenter (which varied from child to child as there were 8 'second experimenters' in total) present in the room. Wherever possible (i.e. with parental consent), sessions were recorded using a small video camera. In order to ensure that there were no inaccuracies or inconsistencies in the coding, all video recordings were watched back and coded again by a third party - who had not taken part in the experiment and knew nothing of its purpose. No inconsistencies were detected.

Metaphor task

Children's responses were recorded as either 'metaphoric', 'literal', or 'control' (a ternary coding system), depending on which of the three pictures they chose. For the

purpose of statistical analysis, these responses were later coded as 1s and 0s (a binary coding system); 1 if the child chose the picture depicting the correct metaphoric interpretation, or 0 if the child chose either the literal or the control picture.

IC tasks

Each child was given a score out of 13 for the grass/snow task (i.e. there were 13 trials in this task, and each time the child touched the wrong coloured card, 1 point was deducted), and a score out of 6 for the bear/unicorn task (i.e. the child was asked to do 6 different things by the bear and the child and 1 point was deducted each time the child did as the bear asked them to). These two scores were then combined to obtain an overall score out of 19. Only the final choice made by the child was considered (e.g. subtle hesitations were scored as correct).

Naming and pointing task

For the naming section of the task, children's responses were coded as 1s and 0s. Responses were coded as correct (1) if deemed to be an appropriate label for the given object/scene (i.e. 'car' 'broken car' or 'car stuck', for the picture of a car with a missing wheel) or incorrect (0) if considered to be an inappropriate label (i.e. 'fridge' or 'table' for the picture of a car with a missing wheel). Instances of 'overextension' were also coded as incorrect (e.g. 'monkey' for the picture of a little boy climbing a tree). Responses were not considered to be overextensions if they were in the form of a simile (e.g. 'the boy like a monkey'), if they contained the verb 'pretending' (e.g. 'the lady pretending to be a zebra' for the picture of the lady in striped pyjamas), or if they used the overextension as an adjective to describe the correct label (e.g. 'the zebra lady').

For the pointing section of the task, the children's responses were again coded as 1s and 0s. If the child pointed to the correct object on the page, they were scored as 1, and if they pointed to any of the incorrect pictures on the page, they were scored as 0 for that item.

Each child was then given a total score in the form of % correct for both the naming and pointing tasks separately, and combined.

RESULTS

Adult control group

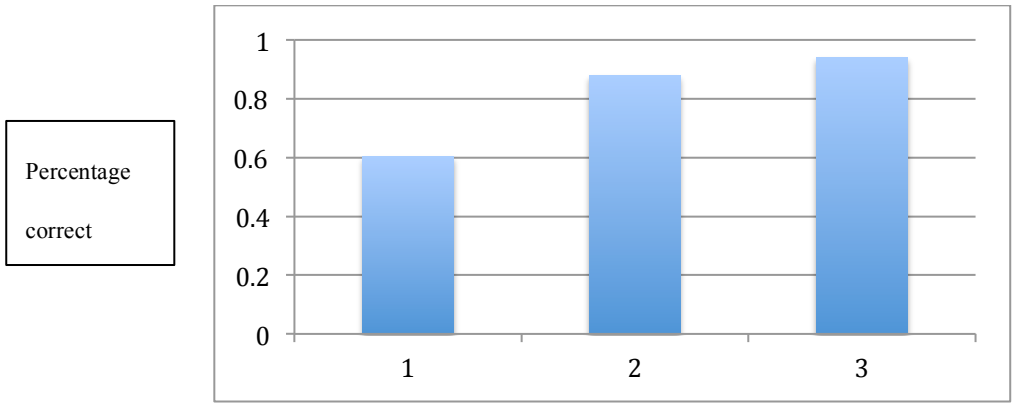
The adult control group chose the correct picture 100% of the time, indicating that the novel metaphors we used were readily understandable. In addition, the adult control group was at ceiling on both inhibition control tasks.

Initial analysis of child data

In the metaphor task, no child was excluded on the pre-determined basis of answering more than 1 out of 3 practice trials incorrectly. The mean percentages of correct answers for the three age groups (3 year-olds, 4 year-olds, and 5 year-olds) across items were 60%, 88%, and 94% respectively. Comparisons with chance, reveal that all three age groups performed significantly ($p<.0001$) above chance (.33).

Analysis of variance in performance, between age groups were analysed using a General Linear Mixed Model analysis (GLINMIX)[29] in SAS, with age group as a fixed effect, and subject as a random effect. A main effect of age group ($F(2,49)=12.5$ $p<.0001$) indicated an age group difference in performance on the metaphor a tasks.

Figure.6 Mean accuracy scores for each age group on the metaphor task



1= 3 yr olds; 2= 4 yr olds, 3= 5 yr olds

[29] Mixed model analysis provides a general, flexible approach in these situations, because it allows a wide variety of correlation patterns (or variance-covariance structures) to be explicitly modeled. Multiple measurements per subject generally result in the correlated errors that are explicitly forbidden by the assumptions of standard (between-subjects) AN(C)OVA and regression models.

Analysis of differences between age groups on the task, adjusted for multiple comparisons (Sidak), reveals that 4 ($p=0.0006$) and 5 ($p<0.0001$) year olds performed significantly better than 3 year olds on the metaphor task. No other comparisons were significant.

Breakdown of incorrect choices

21.8% of incorrect answers in the metaphor task were cases in which the child chose the control picture, rather than the picture depicting the literal interpretation of the vehicle. For 3 year olds alone, this figure was 28.9%, for 4 year olds it was just 10%, and 5 year-olds never chose the control picture (0%).

Pairwise comparisons reveal that there was a) a significant difference between 3 year olds and 4 year-olds ($p = .03$) and 3 and 5 year-olds ($p<.0001$), with respect to the percentage of incorrect choices which were instances in which the child chose the control picture.

Vocabulary

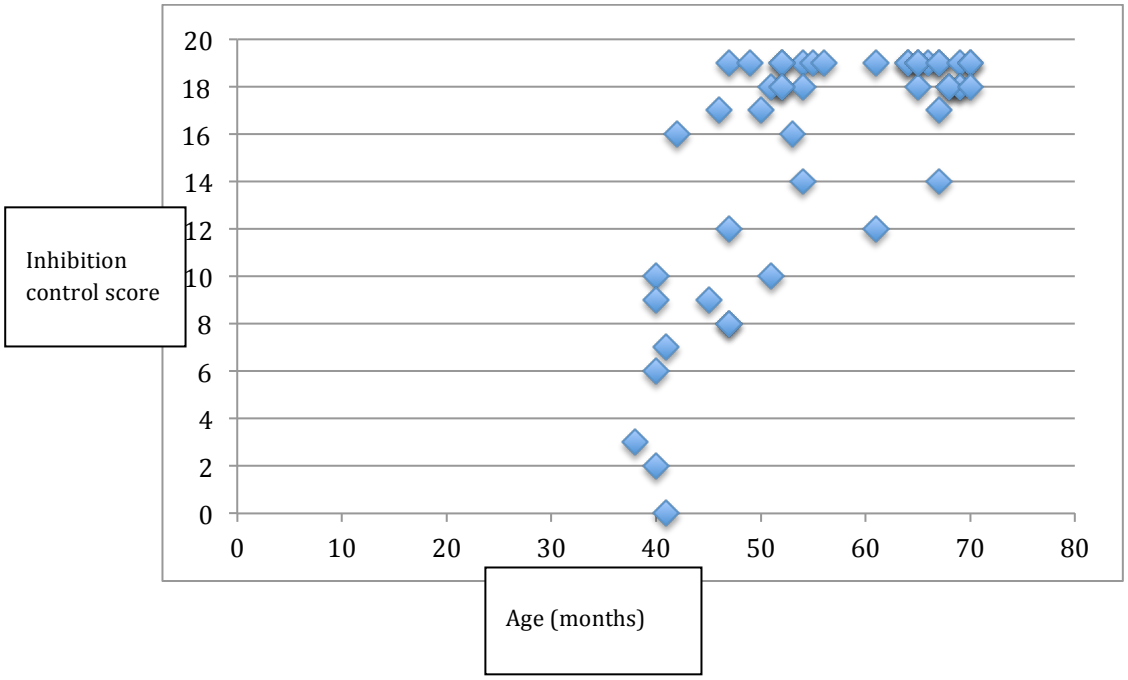
Although 96% of responses on the vocabulary test were accurate, there were some cases in which the child either produced an inappropriate label (e.g. 'dog' for a picture of a monkey), or produced an overextension (e.g. 'monkey' for a picture of a boy climbing a tree), or pointed to the wrong picture in the comprehension test. Therefore, the GLINMIX analysis was re-run with the metaphor item data points corresponding to these inaccuracies removed from the metaphor task data. The main effect of age group remains ($F(2,416)=10.58$ $p=<0.0001$), and the analysis of differences between age groups, adjusted for multiple comparisons (Sidak), reveals the same significant differences between groups. Again, four ($p=0.02$) and five year olds (<0.0001) perform significantly better on the metaphor task than 3 year olds.

With inhibition control as a covariate

The mean inhibition scores for the three age groups were 9, 17.4 and 18, respectively. Analysis of differences between age groups, adjusted for multiple comparisons (Sidak), reveals that 4 ($p<.0001$) and 5 ($p<0.0001$) year olds performed significantly better than 3 year olds on the inhibition control tasks. Four and five year olds did not differ significantly in this respect ($p=1.000$).

The scatter plot in figure.7 suggests a positive correlation between age and inhibition control score, with older children scoring higher on the inhibition control tasks.

Figure.7 Correlation between age (months) and inhibition control score.



Furthermore, a correlation analysis (Kendall's Tau) reveals that age and inhibition control scores are positively correlated ($r=.485$, $N=48$, $p<.0001$).

With performance on the inhibition control task factored into the GLINMIX analysis as a covariate, there was a main effect of inhibition ($F(1,239)= 7.50$ $P = .0066$), suggesting that performance on the inhibition control task was closely related to performance on the metaphor task. The main effect of age group disappeared ($F (2, 239)= 2.05$ $p=0.13$), which was to be expected as performance on inhibition control scores were highly correlated to age.

Analysis of differences between age groups in the different trope conditions, adjusted for multiple comparisons (Sidak), with inhibition scores factored in as a covariate, reveal that the differences between 3 and 4 year olds' ($p=0.71$) and 3 and 5 year olds' ($p=0.13$) when performance on the metaphor task are no longer significant, suggesting that the differences between age groups can, at least to some degree, be accounted for by inhibition control capacity.

With vocabulary as a covariate

With vocabulary production and comprehension scores factored into the GLINMIX analysis as covariates, there was no main effect of vocabulary production $F(1,239)=0.00$ $p=.96$) or vocabulary comprehension $F(1,488)=0.70$ $p=.40$), suggesting that there was little connection between performance on the vocabulary naming and pointing task and performance on the metaphor task due to the fact that the children perform well on the vocabulary tasks. Furthermore, performance on the vocabulary tasks was factored into the GLINMIX analysis, there remained a main effect of age group ($F(2,239)=11.26$ $p<.0001$), which suggests that the differences between age groups, cannot be accounted for by performance on the vocabulary score.

Furthermore, the analysis of differences between age groups reveals that the differences between 3 and 4 year olds' ($p= .0081$) and 3 and 5 year olds' ($p<.0001$) performance on the metaphor task, remain significant.

DISCUSSION

Metaphor task

All three age groups performed above chance on the metaphor task, suggesting that children as young as 3 are able to interpret metaphors, provided the task and vocabulary used, as well as the pertinent world knowledge, are appropriate for this age group. This finding replicates that of Pouscoulous and Tomasello (2011), but with added strength, as this paradigm shows that children as young as 3 years old chose the correct picture 60% of the time, even with the interference of a conflicting literal interpretation of the metaphor/hyperbole vehicle (i.e. the children showed signs of being able to suppress the literal interpretation of the vehicle).

Four year olds and five year olds performed significantly better on the metaphor task than three year olds. Five year-olds were at ceiling in the metaphor task, suggesting that they are highly competent at interpreting age appropriate metaphors. Although there is a slight improvement between the ages of 4 and 5, 4 year olds also show a high competence level on this task. This is a stark contrast with previous findings (See

Pouscoulous 2011 for overview, or Nippold 1988/1998 and Winner 1988/1997 for in-depth review), which suggest that children of this age have little success at comprehending metaphor.

As discussed in the preceding sections, there are a number of other factors that could have affected the 3 year olds' ability to accurately interpret the metaphors. World knowledge is a factor which is unlikely to be at play in this data, as the naming and pointing task data confirms that 3 year olds were just as familiar with the vocabulary used in the experimental items, as the old two age groups, and performance on the vocabulary naming and pointing task and the metaphor and hyperbole picture selection tasks were not connected. Moreover, the metaphor and hyperbole items were designed such that they pertained to conceptual domains that are familiar to 3-year-olds (confirmed by our pilot data).

However, if Gibbs' (1990; 1992) claims are accurate, and pre-existing conceptual mappings in long-term memory are used during metaphor comprehension, then the youngest children might be finding metaphor comprehension more difficult because of a lack of experience from which to construct mappings between the topic and vehicle categories (Person with wet, spiky hair – Hedgehog). However, the fact that the 5 year olds performed at ceiling is confirmation that the relevant mappings were not beyond the experience of pre-school children.

It is also reasonable to assume that the picture selection task itself was not the cause of the difference between age groups. The 3-year-olds did not appear to have any more difficulty with the task than the 4-and-5-year-olds; concentration levels were high and no child was eliminated on the basis of answering more than 2 out of 7 practice trials incorrectly.

IC scores correlated closely with performance on the metaphor task. However, IC scores also correlated closely with age (illustrated by the fact that the difference between age groups was lost when the inhibition scores were added to the GLINMIX analysis as a covariate, and by the correlation analysis), which means that 3 year olds were significantly worse at the IC tasks than 4 and 5 year olds. This matches previous findings suggesting a marked improvement in IC at around the age of 4 (see Diamond & Taylor 1996; Frye et al 1995; Gerstadt, Hong & Diamond 1994; Jerger, Martin &

Pirozzolo 1988; Kochanska et al. 1996; Livesey & Morgan 1991; Reed, Pien & Rothbart 1984).

While IC score correlated closely with age as well as performance on the metaphor task, it is not possible to infer that inhibition control capacity, rather than other age related factors, is responsible for performance on the metaphor task. Since we found the greatest amount of variability in 3 year olds' IC scores, it would make sense to collect more data from children in this age range in order to separate IC score from age and further explore a potential correlation between IC capacity and metaphor comprehension capacity. This is one of the main aims of Experiment 2, reported below.

Anecdotal evidence

Some relevant comments recorded during testing (e.g. "*Cars don't really have feet though do they?"* (a 4 year-old); *"That's funny….we are calling her a hedgehog"* (a 3 year-old) suggest that (certainly in the case of these specific children) when the correct picture was chosen, the children were in fact interpreting the story figuratively, and not overextending the metaphor or hyperbole vehicles. Moreover, children frequently laughed when choosing the correct picture, which suggests that they were not only correctly interpreting the item figuratively, but that they were also appreciating the humorous nature of the stories, which would not be the case if the child believed the metaphor vehicle to be an appropriate label for the topic of the story (i.e. a 'hedgehog' to be an appropriate label for a girl with wet spiky hair). This evidence suggests that it may not be accurate to dismiss instances of apparent child metaphor comprehension as instances of overextension.

SUMMARY OF FINDINGS FROM EXPERIMENT 1

The data discussed above suggest that children as young as 3 years old can accurately interpret novel metaphors even when a literal interpretation of the metaphor vehicle is available, provided that the task and materials are age appropriate. This is in stark contrast with earlier findings, which suggest that children of this age are not able to

interpret language non-literally. However there is still substantial improvement in comprehension ability between 3 and 4 years old, and an improvement again between 4 and 5 years old, with 5 year olds performing at ceiling, suggesting a developmental impact on cognitive processing.

The correlation between metaphor comprehension capacities and IC needs to be further explored, and will be in Experiment 2 (see 4.3.2 below), in which an additional group of sixteen children aged between 3;1 and 3;11 will be tested using the same paradigm as in Experiment 1. By testing a group of children with a narrower age range, but with some variability in IC scores, we will be able to assess whether variability in performance on the metaphor task can be attributed to variability in performance on the IC tasks, irrespective of age.

In addition, Experiment 2 will include a hyperbole task, which will allow us to directly contrast children's ability to accurately interpret novel metaphors and hyperboles, in order to further explore the potential processing differences between metaphor and hyperbole suggested by our reading-time findings (see section 3.2). This is the first time metaphor and hyperbole will have been compared in a developmental study, using a paradigm of this kind.

4.3.2 EXPERIMENT 2

A new group of three year-old children were tested on their ability to accurately interpret novel, age appropriate metaphors and hyperboles. The same picture selection task and 6 metaphoric stories from Experiment 1 were used in this experiment. However, in addition, children were presented with a second picture selection task containing 6 novel hyperbolic stories. With trope as a within subject factor, we were able to directly contrast children's ability to comprehend age appropriate novel metaphors and hyperboles. Any difference between children's ability to interpret one trope over another would (a) not be predicted by the current theoretical accounts discussed in chapter 1, which either overtly propose, or suggest that metaphors and hyperboles are interpreted via the same pragmatic processes, and using the same cognitive mechanisms, and (b) would suggest that what we know about children's understanding of metaphors cannot always be generalized to all non-literal language.

To my knowledge, there are no previous developmental studies that have investigated pre-school children's understanding of novel hyperboles (without the presence of irony), and this is the first time metaphors and hyperboles have been directly contrasted using a paradigm of this kind.

Again, children's inhibition control capacities were also tested in order to further explore a potential relationship between children's figurative language comprehension capacities and their inhibition control capacities. Finding a difference between children's performance on the metaphor and hyperbole tasks with respect to the degree to which their performance can be predicted by their performance on the IC tasks would suggest that IC might be more critical during the interpretation of one trope (e.g. metaphor) than it is during the interpretation of the other (e.g. hyperbole), i.e. inhibitory mechanisms may be necessarily required during the interpretation of metaphors, whereas they may just be beneficial during the interpretation of hyperboles. If this were the case, children with poor IC would, of course, find metaphor comprehension more difficult than hyperbole comprehension.

METHOD

Participants

A random opportunity sample of 18 monolingual, English speaking children aged between 3;1 and 3;11 years (6 boys and 12 girls, mean age 3;7) were recruited from three South-London nurseries. In addition, 10 adults aged between 21 and 57 made up a small adult control group.

The age of the children was motivated by one of the sub-aims of this experiment; to further explore a possible correlation between metaphor comprehension capacity and IC capacity, by investigating whether IC score and performance on the metaphor comprehension task are correlated when there is no correlation between IC score and age. Three year-olds showed the greatest variability in IC scores of all three age-groups in experiment 1, therefore, by testing just children in this narrow age range, we

had the best chance of properly investigating the relationship between IC capacity and metaphor comprehension, where age is not so much of a factor.

Metaphor and hyperbole task materials

As already mentioned, the metaphor task materials were the same as those used in Experiment 1. Again, all of the new hyperbole materials were constructed specifically for children aged as young as 3. Parents of 3 year-old children were consulted on their opinion of how well their child understood the relevant vocabulary. As with the metaphor items, nine hyperbole items were piloted on eleven 3 and 4 year-old children to a) ensure that children of this age had full command of the relevant vocabulary, and b) to determine whether the children were able to interpret the intended meanings. Based on the pilot results, 6 hyperbole items were chosen for the experiment.

Again, based on previous findings in relation to the effects of context on children's understanding of metaphor (Vosniadou et al. 1984; Reynolds and Wilson 1984), we endeavored to make the short stories which preceded the hyperbolic statements as brief as possible so as not to overload the child with information, while ensuring that the brief narrative within the stories still supported the intended hyperbolic interpretation. Furthermore, we ensured that the child could not choose the correct picture based on the context alone (i.e. there was nothing in the story, apart from the final hyperbolic statement, which would rule out either the literal or the control picture).

Table 3. Metaphor and hyperbole experimental items

	Stories
Hyperbole 1	It's Saturday, and Tom is playing outside in the rain. He is splashing in the lake outside of his house. Can you find the picture in which Tom is splashing in the lake outside his house?
Hyperbole 2	This weekend, Jonny has been helping his mummy with the gardening. Now, the house is a forest. Can you find the picture in which the house is a forest?
Hyperbole 3	It is Saturday, and Emma and her daddy are having a picnic. Emma is very thirsty; she is drinking a bucket of juice. Can you find the picture in which Emma is drinking a bucket of juice?
Hyperbole 4	This weekend, Danny and his sister are playing in the living room. The sofa is a trampoline. Can you find the picture in which the sofa is a trampoline?
Hyperbole 5	It is Sunday, and Charlotte is putting on her new shoes. Her shoelaces are so difficult; they are skipping ropes. Can you find the picture in which Charlotte's shoelaces are skipping ropes?

Hyperbole 6	This weekend, Jane is playing in the garden with her daddy. Jane is flying through the air. Can you find the picture of Jane flying through the air?
Metaphor 1	It's Sunday afternoon, and Alex is playing outside in the fresh air. Today, Alex is a monkey. Can you find the picture in which Alex is a monkey?
Metaphor 2	This weekend, Harry is going on holiday with his Daddy. Harry's car has a backpack. Can you find the picture in which the car has a backpack?
Metaphor 3	This weekend, Stephen is going on holiday in his car. They have had to stop because Stephen's car has got a bad foot. Can you find the picture in which the car has a bad foot?
Metaphor 4	It's Saturday night, and Katy is playing with her toys before bed-time. Katy is a zebra playing with her toys. Can you find the picture in which Katy is a zebra?
Metaphor 5	This weekend, Emily is staying at her granny's house. Emily has had a bath and now she is a hedgehog. Can you find the picture in which Emily is a hedgehog?
Metaphor 6	It's Saturday, and Archie is going to a party. Archie is ready to leave for the party and he has a bush on his head. Can you find the picture in which Archie has a bush on his head?

Procedure

Each child was presented with 5 tasks; a metaphor picture-selection task, a hyperbole picture-selection task, two inhibition control tasks (the same 2 tasks as were used in experiment 1), and a word naming and pointing task (to ascertain whether the child had a good grasp of the vocabulary necessary for both the metaphor and hyperbole picture selection tasks).

We found that all of the children in our pilot group were capable of completing all five tasks in a row, and maintaining concentration on each task.

The metaphor and hyperbole picture selection tasks

In this experiment, each child was shown two picture books (a metaphor one, and a hyperbole one) containing some short stories. The metaphor picture book was exactly the same as that which was used in the first experiment, and exactly the same procedure was followed (see section 4.3.1). The hyperbole picture book contained the 6 new hyperbolic stories, and the exact same procedure was followed as was followed for the metaphor picture book (see section 4.3.1). Again, the children were read an introductory story on the first page of the picture book, about a class of children who are all friends at school. Then they were told that the rest of the picture book is about what each of the children in the class are doing at the weekend. The experimenter explained the following; "*Let's look at what each of the children are doing at the weekend!", "Oh no, all the pictures have gone missing from the picture book, and*

have become all jumbled up! If we read each of the stories, can you help me find the right picture to go with each story?" (pointing at a pile of jumbled up pictures).

As in the metaphor picture book, after being read an introductory story about a class of children each doing something different at the weekend, the children were read a series of short stories, one at a time. Each story ended in a sentence that should be interpreted hyperbolically in the given context (e.g. *This weekend, Jonny has been helping his mummy with the gardening.* ***Now the house is a forest***). Again, as with the metaphor picture book, there were 6 stories.

Again, after each story, they were asked to select which picture from a selection of 3 pictures (see materials and counterbalancing below), which were placed in front of them, they thought showed what was happening in the story. Again, there was a space for the child to stick the chosen picture below the story in the picture book.

Again, it was ensured that the three pictures from which the child could choose were as similar as possible, but that they differed in just one respect. One picture depicted an accurate figurative interpretation of the story (e.g. a house full of plants), and the other two pictures depicted an inaccurate interpretation given the context.

Figure.9 shows the correct, hyperbolic picture for the hyperbole item 2 '*the house was a forest'*.

Figure. 9 Correct hyperbolic picture for the hyperbole item 2 '*the house is a forest'*

A second 'control' picture depicted a nearly identical image to the first one, except for in this image, there was always nothing relating to the figurative interpretation, but

something else was depicted (e.g. lots of pictures on the wall), as illustrated in figure.10.

Figure . 10 Control hyperbolic picture for the hyperbole item 2 '*the house is a forest'*

Finally, a third 'literal conflicting' image was again, almost exactly the same as the other two pictures, but this time, somewhere in the image, there was a conflicting literal interpretation of the metaphor vehicle (e.g. a forest in the background). See figure.11 below.

Figure. 11 Conflicting literal picture for the hyperbole item 2 '*the house is a forest'*

As with the metaphor pictures, it was ensured that all three pictures were equally exciting, salient, colourful, and interesting for all items (i.e. that the one small difference between the three pictures did not cause one of the pictures to be more interesting to children than the others), as such differences may have skewed the results. This was verified during piloting. See appendix B for full list of materials.

As with the metaphor picture book, before seeing the 6 experimental items, there were 3 literal practice trials. In total, there were 6 practice trials, 3 at the beginning of each picture book.

Inhibition control tasks (Carlson and Moses (2001)

The same two Inhibition Control tasks from experiment 1 (the grass/snow task and the bear/unicorn task) were used in this experiment (see section 4.3.1).

Naming and pointing vocabulary task

Again, at the end of testing, as in Pouscoulous and Tomasello (2011), the children were given a naming-and-pointing game with a picture book designed specifically for his experiment, to determine their comprehension and production of the vocabulary used in the metaphor and hyperbole tasks. The naming and pointing picture book was the same as that used in Experiment 1; however, additional pages were added to correspond to the new hyperbole items used in the hyperbole picture book. Therefore, for the purposes of this experiment, the picture book consisted of 24 pages: 12 for naming (6 corresponding to the 6 metaphor items, and 6 corresponding to the 6 hyperbole items), and 12 for pointing (6 corresponding to the 6 metaphor items, and 6 corresponding to the 6 hyperbole items). Again, the first 12 pages had four pictures on each page; one of the literal interpretation of the metaphor/hyperbole vehicle (e.g. *a monkey or a lake*), one of the figurative interpretation of the story (e.g. *a little boy hanging from a tree or a little boy splashing in a puddle*), one of an unrelated object or event (e.g. *a shoe or a house*), and one of an unknown object. For each of the objects on these first 12 pages, the child was asked *"what is this?"* and the child was expected to produce a label for the object. Pages 13-24 had three pictures on each page; one of the literal interpretation of the metaphor or hyperbole vehicle (a different image from that used in the naming section of the picture book); one of the figurative interpretation of the story (again, a different image from that used in the naming section), and finally, an unrelated object or event. For each of the objects on these pages (13-24), the child was asked "*can you point to the [ ]?",* and the child was expected to point to the correct object.

It was ensured that the whole procedure took no longer than 20 minutes per child, and on average it took between 15 and 20 minutes per child. Small play breaks were taken if a particular child became tired or distracted, but generally, the tasks were delivered quickly in order to hold the child's attention.

Counterbalancing

Whether the child saw the metaphor or hyperbole pictures first, was counterbalanced across participants.

The stories within each (metaphor or hyperbole) picture book were presented in a random order for each participant. Random orders were generated using 'Random.org'. In addition, as in Experiment 1, the position of the three pictures was counterbalanced (between right, left and middle) across participants using a Latin square. This means that there were 6 lists for picture position (c= control, l = conflicting literal picture, f= correct figurative picture) (see table 2, section 4.3.1).

Again, the grass/snow tasks and bear/unicorn tasks were in a fixed order – each child saw the grass/snow task first, followed by the bear/unicorn task.

The IC tasks were always presented in between the two (hyperbole and metaphor) picture books, and the vocabulary naming and pointing task was always presented last.

Coding

As in experiment 1, children's responses to all 5 tasks were hand recorded by a second experimenter (which varied from child to child as there were 10 'second experimenters' in total) present in the room. Again, wherever possible (i.e. with parental consent), sessions were recorded using a small video camera. Again, in order to ensure that there were no inaccuracies or inconsistencies in the coding, all video recordings were watched back and coded again by a third party (who knew nothing about the purpose of the experiment). Zero inconsistencies were detected.

Coding for each task was exactly the same as that described for experiment 1 (see section 4.3.1).

RESULTS

Adult control group

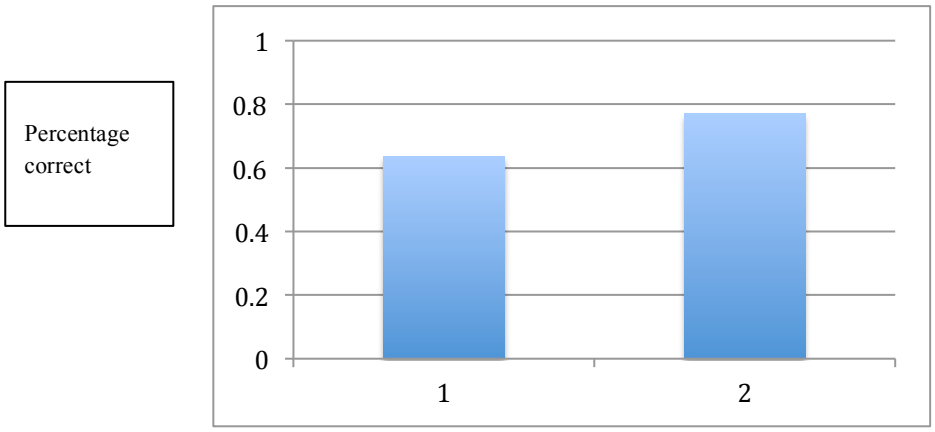
The adult control group chose the correct picture 100% of the time in both the metaphor and hyperbole tasks. Due to a ceiling effect in the adult control group in Experiment 1, for the purposes of this experiment, the adult control group were not tested on the IC tasks.

Initial analysis of child data

Data corresponding to two children were excluded on the pre-determined basis of answering more than 2 out of 6 practice trials incorrectly. The mean percentages of correct answers for the two tropes (metaphors and hyperboles) were 64% and 77% respectively (both significantly above chance ($p<.0001$).

Analysis of variance in performance between tropes was analysed using a General Linear Mixed Model analysis (GLINMIX) in SAS, with trope as a fixed effect, and subject as a random effect. A main effect of trope ($F(1,175)=4.27$ $p=.04$) indicated a significant difference between performance on the metaphor and hyperbole tasks.

Figure.12 Mean accuracy scores for each picture-selection task



1= Metaphor 2= Hyperbole

Analysis of difference, adjusted for multiple comparisons (Sidak), between performance on the metaphor and hyperbole tasks, reveals that there is a significant difference ($p=.04$) between the children's performance on the metaphor and hyperbole tasks.

Breakdown of incorrect choices

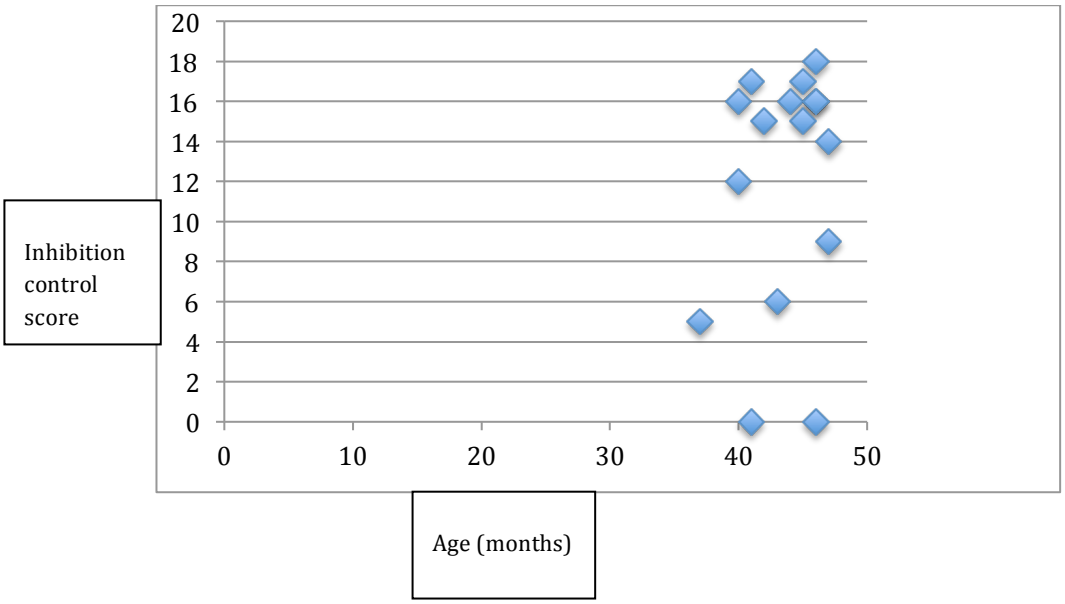
28.5% of incorrect answers in the metaphor task and 27.2% in the hyperbole task were cases in which the child chose the control picture, rather than the picture depicting the literal interpretation of the vehicle.

Pairwise comparisons reveal that there was not a significant difference between the metaphor and hyperbole conditions with respect to the percentage of incorrect choices which were instances in which the child chose the control picture.

With inhibition control as a covariate

The scatter plot in figure.13 suggests that, as expected due to the narrow age range of the children, there is no correlation between age (in months) and IC score.

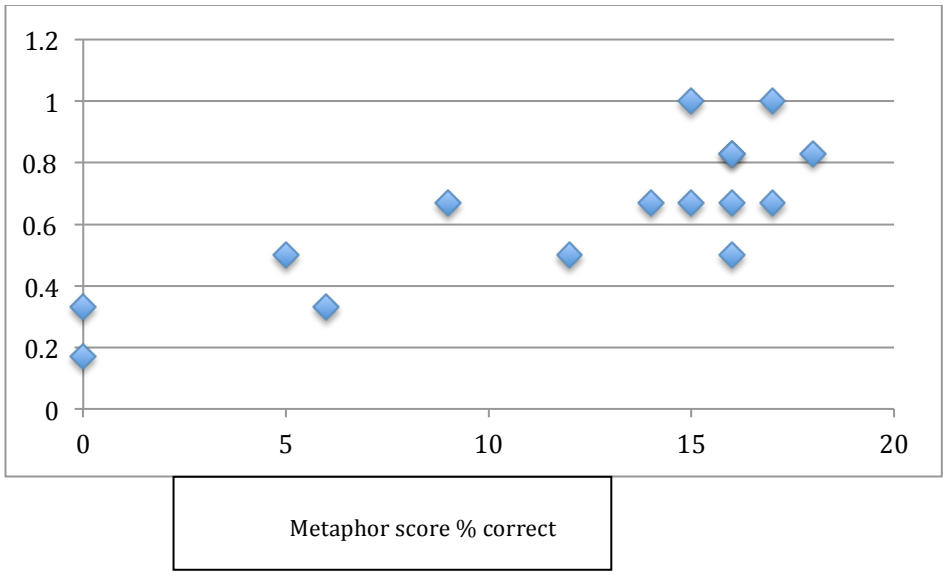
Figure.13 Relationship between age (in months) and inhibition control score.



Indeed, a correlation analysis (Kendall's Tau) confirms that age and inhibition control scores are not positively correlated (r=.277 , N=18, p=.266).

The scatter plot below (figure 14) suggests that there is a correlation between metaphor performance and inhibition score.

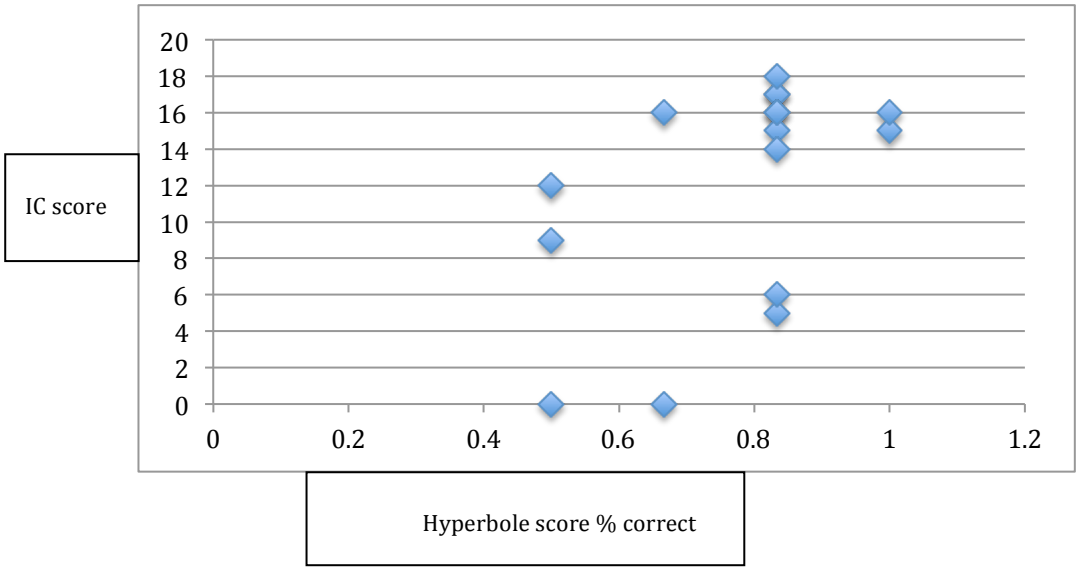
Figure.14 Correlation between inhibition control and performance on the metaphor task



Indeed, a correlation analysis (Kendall's Tau) reveals that there is a strong positive correlation between inhibition control score and performance on the metaphor task (r=.622, N=16,p=.002).

The scatter plot below (figure 15) suggests that there is less of a correlation between IC score and performance on the hyperbole task.

Figure. 15 Relationship between IC score and performance on the hyperbole task



Indeed, a correlation analysis (Kendall's Tau) reveals that there is not a significant correlation between inhibition control score and performance on the hyperbole task (r=.363, N=16, p<.084).

Furthermore, with performance on the inhibition control task factored into the GLINMIX analysis as a covariate, there was a main effect of inhibition (F(1,175)= 15.30 P<.0001), again, suggesting that performance on the inhibition control task was a predictor of performance on the two trope tasks, when both trope tasks are taken together. However, the main effect of trope remains (F (1,175)= 4.53 p=0.03), which suggests that the difference between children's performance on the two trope tasks cannot be entirely attributed to their inhibition control capacity. There is likely to be some other factor(s) contributing to children's differing performances on the metaphor and hyperbole tasks.

Indeed, analysis of differences between tropes, adjusted for multiple comparisons (Sidak), with inhibition scores factored in as a covariate, reveal that the significant difference between children's performance on the metaphor and hyperbole tasks remains (p=.03), which again, confirms that the trope effect cannot be entirely attributed to the tropes differing relationship with IC capacity.

With vocabulary as a covariate

With vocabulary scores factored into the GLINMIX analysis as a covariate, there was no main effect of vocabulary production (1,163)=0.41 p=.52) or vocabulary comprehension F(1,174)=2.90 p=.09), suggesting that there was little connection between performance on the vocabulary task and performance on the metaphor task. There was still a main effect of age group (F(1,174)=5.23 p=.02), which suggests that the differences between age groups, cannot be accounted for by performance on the vocabulary score.

Furthermore, the analysis of differences between tropes reveals that the difference between (p=.02) performance on the metaphor and hyperbole tasks, remains significant.

DISCUSSION

Metaphor task

As in Experiment 1, the children performed above chance on the metaphor task, suggesting that children as young as 3 years old are able to interpret novel metaphors, provided the task and vocabulary used, as well as the world knowledge pertained to, are appropriate for this age group. As already discussed in Experiment 1, this finding replicates that of Pouscoulous and Tomasello (2011), but with added strength, as this paradigm shows that children as young as 3 years old chose the correct picture 64% of the time, even with the interference of a conflicting literal interpretation of the metaphor vehicle (i.e. the children showed signs of being able to suppress the literal interpretation of the vehicle). Again, it is important to reiterate that this is a stark contrast with previous findings suggesting that children of this age have little success at comprehending metaphor (See Pouscoulous 2011 for overview, or Nippold 1988/1998 and Winner 1988/1997 for in-depth review) .

Correlation between Inhibition Control and metaphor comprehension

As expected, due to the narrow age range of the participants, IC scores did not correlate with age, but IC score and performance on the metaphor task were strongly correlated. This suggests, that IC capacity, at least in part, can explain the variability in children's performance on the metaphor task.

This suggests that our attention and regulation mechanisms (executive functions) are employed during metaphor comprehension, which is in line with previous findings (see section 2.1.4). As we know that these mechanisms are responsible for suppressing irrelevant and/or conflicting information during processing, our findings tentatively suggest that metaphor interpretation involves active suppression.

Hyperbole task

As with the metaphor task, children performed above chance on the hyperbole task. In fact, they performed significantly better on the hyperbole task, than they did on the metaphor task. This indicates that some feature of metaphor comprehension makes it more difficult than hyperbole comprehension for children this age. Our findings suggest that children may find hyperbole comprehension slightly easier than metaphor

comprehension because their ability to accurately interpret hyperbolic statements is not dependent on their IC capacity (which our data indicate is somewhat underdeveloped) in the same way as their ability to accurately interpret metaphoric statements is (see below).

Relationship between Inhibition Control and hyperbole comprehension

A correlation analysis revealed that IC score and performance on the hyperbole task were not significantly correlated as IC score and performance on the metaphor task were. Therefore, it cannot be claimed, based on our findings, that a child's ability to accurately interpret hyperbolic statements is dependent on their inhibition control capacity in the same way a child's ability to interpret metaphoric statements is.

This is not expected given the fact that our word-naming data suggest that lexically encoded content becomes deactivated during novel hyperbole comprehension, just as it does during novel metaphor comprehension. If this deactivation is the result of active suppression, then we would expect those cognitive mechanisms responsible for active suppression (i.e. IC mechanisms) to be equally active during novel hyperbole and metaphor comprehension, which does not appear to be the case. One possible explanation for this finding is that suppression is necessary during metaphor comprehension (possibly because many features associated with the lexically encoded vehicle concept are in direct conflict with a metaphoric interpretation), but just optional and beneficial during hyperbole comprehension (where features associated with the lexically encoded vehicle concept may be irrelevant, but not inconsistent with a hyperbolic interpretation). Thus, children with poor IC can still get by at interpreting novel hyperboles (even though they will likely be slower than adults who have at their disposal, good IC capacities), whereas they struggle with novel metaphor interpretation.

However, the GLINMIX analysis with inhibition factored in as a covariate highlighted that performance on the inhibition control task was not the only factor contributing to the difference between children's performance on the two trope tasks. The analysis suggests that there is some other unmeasured factor(s) also contributing to the difference.

It is important to note that there were only 6 items for each trope. It could be argued that the difference between children's performance on the metaphor and hyperbole tasks had nothing to do with trope, but rather with these specific hyperbole items being easier for the children than the specific metaphor items used. This is a possible explanation. However, I would argue that it is an unlikely one. Indeed, there is nothing obviously simpler in the hyperbolical material compared to the metaphorical one, and both sets of materials were constructed using the same constraints.

Anecdotal evidence

As in Experiment 1, some relevant comments recorded during testing on the hyperbole task ("It's not really a lake though is it, it's a puddle", "They are calling the sofa a trampoline because they're jumping on it") suggest that (certainly in the case of these specific children) when the correct picture was chosen, the children were in fact interpreting the story figuratively, and not overextending the hyperbole vehicles.

SUMMARY OF FINDINGS FROM EXPERIMENT 2

The data from Experiment 2 confirm that children as young as 3 years old can accurately interpret novel metaphors. In addition, they indicate that 3 year-old children are even better at accurately interpreting novel hyperboles. Provided that the task and materials are age appropriate, children are able to ignore the available, literal interpretation of the metaphor or hyperbole vehicle, and arrive at an accurate figurative interpretation of the statements.

Again, it is important to emphasize that our metaphor findings are in line with Pouscoulous and Tomasello's (2011) act-out task findings, which were suggestive of 3 year-old children's capacity to interpret metaphoric statements, provided that they are age appropriate, but our findings contrast with earlier findings, which suggest that children of this age are not able to interpret language non-literally. Moreover, this is the first time metaphor and hyperbole comprehension have been compared in a developmental study, using a paradigm of this kind. Finding a significant difference between children's ability to understand metaphors and hyperboles is important, not

just because it raises questions for theoretical accounts of figurative language comprehension that posit the same comprehension processes and mechanisms for both tropes, but also because it draws into question the common practice of treating metaphor as representative of all non-literal language. Our findings suggest that it may not always be appropriate to generalize from what we know or learn about children's abilities with respect to metaphor comprehension, to children's abilities with respect to hyperbole comprehension, or other tropes, just as our reading-time findings suggested that it is not always appropriate to generalize from empirical findings relating to metaphor processing to hyperbole processing.

In fact, our findings suggest that children's ability to accurately interpret novel metaphors is dependent on their IC capacities, whereas children appear to be able to arrive at accurate interpretations of hyperbolic statements despite having poor IC, which suggests that cognitive mechanisms (i.e. IC mechanisms) which are necessary for metaphor interpretation might not be as critical when interpreting other tropes such as hyperbole.

4.4 CONCLUSIONS

Our findings from Experiments 1 and 2 suggest that children as young as 3 years old have the pragmatic capabilities to interpret language non-literally, provided other age related factors are controlled for (e.g. world knowledge, task difficulty, vocabulary), but that underdeveloped cognitive capacities such as inhibition control appear to, at least in part, contribute to 3 year-old children's less than perfect metaphor comprehension capacities. A substantial improvement in metaphor comprehension ability between 3 and 4 years old at the same time as we see a rapid improvement in inhibition control capacity is suggestive of a developmental impact on cognitive processing.

Our developmental finding of a positive relationship between Inhibition Control and metaphor comprehension sits alongside other findings from studies that have investigated this correlation in other neuro-typical and atypical adult populations (Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold and Faust 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007). Yet, this is, to

my knowledge, the first time this relationship has been observed in a child population.

As our IC capacities are known to be responsible for attention and suppression (Eslinger 1996; Zelazo, Carter, Reznick, & Frye, 1997), these developmental findings provide further, tentative support for the hypothesis that active suppression takes place during metaphor comprehension, as is tentatively suggested by ours (see chapter 3) and others' previous findings (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Gold, Faust and Goldstein 2010; Papagno et al. 2003; Peirce, Maclaren and Chiappe 2010) .

However, our findings indicate that IC capacity is significantly less predictive of hyperbole comprehension capacity than it is of metaphor comprehension capacity, which is unexpected given our word-naming data, suggesting that irrelevant, lexically encoded content becomes equally deactivated after having arrived at a hyperbolic interpretation, as it does after arriving at a metaphoric interpretation. If that deactivation is the result of active suppression, then we would expect the cognitive mechanisms responsible for suppression to be equally involved during hyperbole comprehension and metaphor comprehension.

One explanation is that, where metaphor comprehension generally, necessarily requires the suppression of irrelevant, literally encoded content, as it is in direct conflict with arriving at an accurate figurative interpretation, hyperbole comprehension may just benefit from it. In other words, if one is adept at inhibiting irrelevant information (as neuro-typical adults are), then it seems likely that this skill would be automatically utilized wherever it might speed up processing, even if it is not absolutely necessary for the task at hand (e.g. during hyperbole comprehension). This would explain why our word-naming findings (see chapter 3) indicate that irrelevant, lexically encoded content becomes equally deactivated during adult processing of metaphors and hyperboles, while our developmental findings suggest that young children with underdeveloped inhibition control capacities struggle more with metaphor comprehension, where suppression might be necessary, than they do with hyperbole comprehension, where it might not be.

CONCLUSION

The aims of this thesis were to explore what would be an adequate processing model of figurative language, as well as an accurate developmental trajectory for figurative language comprehension capacities, and to examine how various theoretical explanations of figurative language measure up to the experimental evidence. In this conclusion I will first run through the main experimental findings discussed in Chapter 3, and then consider how they bear on the theoretical debate reviewed in the first chapter.

Summary of adult experimental findings

We found that metaphors took significantly longer to read than comparable hyperboles and literal statements, suggesting that metaphors require additional processing effort than hyperboles and literal statements, either at the level of accessing and processing the linguistic representation via the lexicon, or further down the line, in deriving inferences.

Furthermore, we found that the derivation of metaphoric and hyperbolic interpretations completely dampens priming of the lexically encoded vehicle concept, which is tentatively suggestive of suppression taking place during the processing of both metaphoric and hyperbolic statements. This finding is backed up by our eye-tracking findings which suggest that early processing (the stage of accessing and processing the encoded content) of a target sentence is the same in a metaphoric and hyperbolic context; first-pass fixations on vehicles/target words (e.g. it was **noxious**) were significantly longer when preceded by a metaphor or hyperbole biasing context, than when preceded by a literal biasing context.

Summary of the theoretical implications of our adult experimental findings

Before summarizing the consequences of the experimental results for the theories discussed in the first chapter of this thesis, I would like to point out that generally speaking, pragmatic theories yield very few precise predictions about processing. This is also true of theories that purport to offer cognitive accounts, such as those discussed in the latter half of chapter 1. The testable predictions they deliver are confined to a

few, rather specific aspects of pragmatic processing. Furthermore, it is very difficult to compare different theoretical approaches on the basis of experimental evidence alone, either because they make predictions about different aspects of processing or because their predictions aren't sufficiently different. It has been argued that no single study can rule in favour of or against a theoretical account (see Bezuidenhout and Morris 2004, and Noveck, 2001). Still, converging evidence from several studies may narrow down the theoretical options.

Lexically encoded meanings become deactivated during metaphor and hyperbole comprehension

Our finding of the deactivation of the 'literal' meaning during novel metaphor comprehension is consistent with the processing models posited by the Relevance Theoretic account, the Class-inclusion account, and the Structure-Mapping account, but difficult for the Graded Salience Hypothesis to explain, as it states that the literal meaning is not discarded during the comprehension of novel metaphors.

Metaphoric statements take significantly longer to read than hyperbolic statements, which are read and understood as quickly as literal statements

Our reading-time findings are not inconsistent with the broad outline of the unified Relevance Theoretic account, or any of the other accounts that suggest or entail that metaphor and hyperbole are processed in the same way. Our word naming findings suggest that the cause of the reading-time difference between metaphors and hyperboles lies outside of the lexical access and activation regulation processes posited by these accounts. However, the onus is on each of these accounts to explain what other factors, consistent with the processing models they posit, might be contributing to the reading-time difference between metaphors and hyperboles.

I have argued that there are potentially two factors which could be contributing to this reading-time difference between metaphors on the one hand, and hyperboles and literal statements on the other; (1) the fact that the topic and vehicle concepts in metaphors are less semantically related than those in hyperboles and literal statements, and (2) metaphoric interpretations may be richer/more complex (yield more implicatures) than hyperbolic and literal interpretations.

The first of the contributing factors that I argue for can be accounted for by the Relevance Theoretic account, the Class-inclusion account, and the Graded Salience Hypothesis, as all of these accounts entail that the semantic relatedness of a topic and vehicle pairing will affect processing. The Structure-Mapping account on the other hand, does not readily explain the reading-time difference between metaphors and hyperboles. To do so, it might require some critical adaptations.

The second of the contributing factors that I argue for is motivated by the Relevance Theoretic framework, and as such, is not readily explainable by the other accounts, which a) do not discuss implicitly communicated content or its derivation and b) do not posit processing accounts in which a hearer is driven to satisfy their expectation of 'relevance' by deriving implicatures.

Since the empirical evidence from Experiment 1 is consistent with all of the current accounts discussed in this thesis, but the findings from Experiment 3 discredits the Graded Salience Hypothesis, on the basis of the data alone we are left with three viable accounts: The class-inclusion account, the Relevance theoretic accounts, and the Structure-Mapping account. All are, on the whole, compatible with the data discussed in this work.

The concept construction accounts on the one hand, and the Structure-Mapping account on the other, fall on either side of the comparison/categorization debate, and in this respect the two camps are experimentally distinguishable. As I concluded at the end of Chapter 2, the evidence exclusively in support of the two concept construction category assertion accounts (Relevance Theory and Class-inclusion) appears more robust than that put forward as evidence exclusively in support of the Structure-Mapping account (see Chapter 2 for full discussion). Unfortunately, by and large the two concept construction accounts are indistinguishable experimentally; i.e., given the state of the art, empirical facts compatible with one are likely to be compatible with the other.

This being said, Relevance Theory provides a unified account of non-literal language, which explicitly predicts our findings indicating that metaphor and hyperbole are processed via the same processes and mechanisms, whereas the Class-inclusion account is posited as an account of metaphor alone. Moreover, Relevance theory

provides an account of figurative language interpretation which is embedded within a wider account of communication, and even more generally, human cognition. As such, it provides a justification of why processing might go the way it proposes. If human cognition is driven by the search for relevance, then communication will be driven by the search for relevance, and a hearer's interpretation will be the optimally relevant one, not the most literal one. As a psychological account of metaphor processing alone, the Class-inclusion account lacks this dimension.

Developmental experimental findings

Our findings from our developmental Experiments 1 and 2 suggest that children as young as 3 years old have the pragmatic capabilities to interpret language non-literally, provided other age related factors are controlled for (e.g. world knowledge, task difficulty, vocabulary), but that underdeveloped cognitive capacities such as inhibition control appear to, at least in part, contribute to 3 year-old children's less than perfect metaphor comprehension capacities. A substantial improvement in metaphor comprehension ability between 3 and 4 years old at the same time as we see a rapid improvement in inhibition control capacity is suggestive of a developmental impact on cognitive processing.

Implications of our developmental experimental findings

Our finding of a positive relationship between Inhibition Control and metaphor comprehension sits alongside other findings from studies that have investigated this correlation in other neuro-typical and atypical adult populations (Pierce, Mclaren and Chiappe 2010; Monetta and Pell 2007; Gold and Faust 2010; Papagno, Lucchelli, Muggia, and Rizzo's 2003; Amanzio et al. 2007). Yet, to my knowledge, this is the first time this relationship have been observed in a child population.

As our IC capacities are known to be responsible for attention and suppression (Eslinger 1996; Zelazo, Carter, Reznick, & Frye, 1997), these developmental findings provide further, tentative support for the hypothesis that active suppression takes place during metaphor comprehension, as is tentatively suggested by ours (see Chapter 3) and others' previous findings (Gernsbacher, Keysar, Robertson and Werner 1995; 1997; 2001; McGlone and Manfredi 2001; Rubio-Fernandez 2004; 2005; 2007; Gold, Faust and Goldstein 2010; Papagno et al. 2003; Peirce, Maclaren

and Chiappe 2010) .

However, our findings indicate that IC capacity is significantly less predictive of hyperbole comprehension capacity than it is of metaphor comprehension capacity, which is unexpected given our word-naming data, which suggest that irrelevant, lexically encoded content becomes equally deactivated after having arrived at a hyperbolic interpretation, as it does after arriving at a metaphoric interpretation. If that deactivation is the result of active suppression, then we would expect the cognitive mechanisms responsible for suppression to be equally involved during hyperbole comprehension and metaphor comprehension.

One explanation is that, where metaphor comprehension generally, necessarily requires the suppression of irrelevant, literally encoded content, as it is in direct conflict with arriving at an accurate figurative interpretation, hyperbole comprehension may just benefit from it. In other words, if one is adept at inhibiting irrelevant information (as neuro-typical adults are), then it seems likely that this skill would be automatically utilized wherever it might speed up processing, even if it is not absolutely necessary for the task at hand (e.g. during hyperbole comprehension). This would explain why our word-naming findings suggest that irrelevant, lexically encoded content becomes equally deactivated during adult processing of metaphors and hyperboles, while our developmental findings suggest that young children with underdeveloped inhibition control capacities struggle more with metaphor comprehension, where suppression might be necessary, than they do with hyperbole comprehension, where it might not be.

Endnotes

[i]According to Recanati (2004), rather than properties or features, a concept has certain 'conditions of application' associated with it. Therefore, concept narrowing would consist in restricting the denotation of a concept by contextually providing further conditions that are not linguistically encoded. Concept loosening would be the opposite process: some condition of application associated with the lexically encoded concept is contextually dropped so that the extension of the concept is widened (Recanati 2004). Despite the clear similarities between the accounts, there are some major theoretical differences between Recanati's and the relevance theoretic account.

Recanati (1995; 2001; 2004) claims that there are two types of pragmatic process; primary pragmatic processes, and secondary pragmatic processes. According to Recanati (2004), narrowing and loosening are 'primary pragmatic processes'. This type of pragmatic process is characterized in the following ways:

a) By being pre-propositional (i.e. such processes do not require that a proposition has been identified already).
b) By being unconscious (i.e. hearers are not aware of the processes taking place).
c) By being purely associative (i.e. they operate in a blind mechanical fashion that does not involve inferential processing) (Recanati 2004).

According to Relevance theorists all pragmatic processes are inferential rather than some (primary, pre-propositional ones) being merely associative (i.e. the input and output of pragmatic processes are like premises and conclusions in an argument), and all are constrained by considerations of relevance (i.e. they tend to maximize cognitive effects while minimizing processing effort).

However, for Recanati, accessibility guides lexical interpretation (and other primary pragmatic processes), rather than relevance: according to Recanati, when processing a word, its literal interpretation is accessed first, which then triggers the activation of associatively related representations (Recanati 2004). Both the literal concept activated by the linguistic expression and some of the other representations activated by association are possible candidates for the concept that will be selected to constitute part of the proposition expressed. Although these associated candidates are considered after the literal concept, they are all processed in parallel and compete for activation. The representation that is most active or accessible when the interpretation process stabilizes will be selected together with the other components to make up the proposition expressed, while all other candidates for the meaning of the word (i.e. the lexically encoded one) are suppressed (Recanati 1995, 2004).

As with the Relevance theoretic account, according to Recanati (2004), a global literal interpretation does not necessarily precede figurative interpretation (as is suggested by Grice 1975, 1989). However, as both accounts propose that literalness exists at the local lexical level, the literal interpretation of the constituents of a metaphorical expression is accessed before the figurative interpretation of the utterance is derived (Wilson and Carston 2007; Carston 2002; Sperber and Wilson 2002).

It is clear that, with respect to the testable predictions that are relevant to this thesis, Recanati's and the relevance theoretic account are indistinguishable: both propose that a default literal interpretation of an utterance need not be arrived at before an alternative, metaphoric interpretation can be arrived at, both accounts describe narrowing and loosening in terms of property promotion and demotion, which could be understood in terms of degree of activation of the properties in question i.e. metaphor irrelevant features associated with the encoded concept should be less activated than metaphor relevant features (Rubio 2005), and both provide a unified account of all instances in which a narrower or broader meaning is conveyed than that which is lexically encoded.

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APPENDICES: EXPERIMENTAL MATERIALS AND PRE-TESTING QUESTIONNAIRES

A. Experiment 1 : Reading time experiment

1. Pretesting questionnaires

Questionnaire 1 (one of three counterbalanced versions)

This is a questionnaire about how you understand sentences. You will be asked to read a series of sentences presented in pairs. You will then be asked whether you interpreted the second sentence metaphorically, hyperbolically, or literally.

1. Jane's mind was very complex.
2. It was a novel, which was very long.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically? (When something is hyperbolic, the meaning is exaggerated. For example; you might say that your cup of tea is 'boiling' when it is not quite boiling but just too hot.)

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The beautiful sunflower was so impressive.

2. It was a tree, which stood strong.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. Sam and Mark went for a walk in a national park.

2. It was a forest, with winding paths.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The cleaner he was using was a new brand.
2. It was noxious, and disgusting.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. I really don't like that music band.
2. It is mouldy, and I hate it.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

3. Strong acid must not touch your face.
2. It is blinding, and dangerous.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. Working on an oil rig can have medical repercussions.
2. It is deafening, and exhausting.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. They had developed the land next to the church.
2. It was a cemetery now.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The interview had been really hard.
2. It had been an assault of the worst kind.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. He left and took all his love with him.
2. He was a thief, nothing less.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The little baby was always breaking things.
2. He was a terrorist of the worst kind.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The car parked outside my house was in a state.

2. It had been vandalised very badly.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. He is extremely healthy and very supple.

2. An athlete, in fact.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. My dad once clipped me round the ear, but I got him back.

2. It was a really good boxing match that day.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. It is great when my two kids perform for me.

2. I've got my own orchestra playing in here.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. I feel tired of my thoughts. My mind is exhausting.
2. It is a long dark corridor in there.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. I will tell you what the best way to make a gammon is.

2. It is poached in hot water.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The easiest way to get there is on that new route .

2. It is a motorway along there.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. I'm always carrying you around everywhere in my arms.

2. I am your taxi at the moment.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. Here is your new snorkel. Put it in and get used to it.

2. Give it a good chew before we go ahead.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. The car hit the bird so hard. It was found 20 metres away.

2. It was catapulted up high.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. They have found out who did all of those brutal murders.

2. It was a monster; a really big one.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. I won't be able to keep running. My knee is too bad.

2. It is smashed, beyond repair.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. Mum, these spots on my face are ruining everything.

2. They could be fatal, in fact.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. My family have come to be so much like each other.

2. It is a big mirror, now.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. My husband is always hanging around me. He is too clingy.
2. He is a backpack, a heavy one as well.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

1. Although it isn't well paid. I am happy with my first job.
2. It is scaffolding to get higher up.

Would you interpret the SECOND sentence literally, hyperbolically or metaphorically?

On a scale of 1-7, how well did the SECOND sentence relate to the rest of the passage?

1 2 3 4 5 6 7

Questionnaire 2

1)

Please try and give a brief definition of the following words:

Novel (type of book):

Tree:

Forest:

Noxious:

Mouldy:

Blinding:

Deafening:

Mortuary:

Assault:

Thief:

Terrorist :

Vandalised:

Athlete:

Boxing:

Orchestra:

Corridor:

Poached:

Motorway:

Taxi:

Chewed:

Catapulted:

Monster:

Smashed:

Fatal:

Mirror:

Backpack:

Scaffolding:

2) For each of the words below, can you name up to 5 associated words, which immediately come to mind.

Novel (type of book):

Tree:

Forest:

Noxious:

Mouldy :

Blinding:

Deafening:

Mortuary:

Assault:

Thief:

Terrorist :

Vandalised:

Athlete:

Boxing:

Orchestra:

Corridor:

Poached:

Motorway:

Taxi:

Chewed:

Catapulted:

Monster:

Smashed:

Fatal:

Mirror:

Backpack:

Scaffolding:

2. Practice trial target and context sentences

Context sentence	Target sentence	Comprehension statement
Alice likes to walk to the shops every morning to get some milk and the newspaper;	it is her routine these days.	Having a routine keeps you organized.
My daughter loves to dance around the kitchen listening to her favourite music;	it is a joy to watch her.	
Becky was so good at swimming and moving through the water;	she was a fish I would say.	Fish live in water
Tom smelt so bad because he didn't wash often enough;	he was a skunk, most people thought.	
It was almost impossible to eat those cakes you made yesterday;	they were concrete in your mouth.	Concrete is hard
I can hardly move after that race today;	I am dead now.	

3. Experimental target and context sentences

	Context sentence	Target sentence	Comprehension statement
Metaphor	Sam always got lost because the university was enormous;	it was a forest with winding paths.	The university was big and confusing.
Hyperbole	The back yard definitely needed pruning;	it was a forest with winding paths.	The back yard had become overgrown.
Literal	Sam and Mark went to a national park for the weekend;	it was a forest with winding paths.	There are lots of trees in the national park.
Metaphor	The politician's style of politics was typical; it was noxious and disgusting.	it was noxious and disgusting.	He was not a fair and honest politician.
Hyperbole	I had to drink earl grey and I hated it;	it was noxious and disgusting.	The tea tasted bad.
Literal	The varnish he was using was a new brand;	it was noxious and disgusting.	The varnish smelt bad.
Metaphor	I really don't like that music band;	it is mouldy and I hate it.	She thought the music band was out of date and bad.

Hyperbole	I don't want to wear last year's dress;	it is mouldy and I hate it.	Her dress was out of date and unfashionable.
Literal	I am cleaning the bathroom window sill;	it is mouldy and I hate it.	The bathroom windowsill is damp and dirty.
Metaphor	The new novel by that young writer is so radical;	it is blinding and dangerous.	The new novel is different to most novels around today.
Hyperbole	My new lamp is so powerful;	it is blinding and dangerous.	The light is far too bright.
Literal	Strong acid must not touch your face;	it is blinding and dangerous.	Acid can cause permanent loss of sight.
Metaphor	Her big house was not a home anymore;	it was a cemetery now.	Her house felt sad and empty.
Hyperbole	They had said goodbye to so many pets in the garden;	it was a cemetery now.	There were lots of animals buried in the garden.
Literal	They had developed the land next to the church;	it was a cemetery now.	The land next to the church was used for burying people.
Metaphor	The interview had been really hard;	it was an assault of the worst kind.	He wasn't physically wounded in the interview.
Hyperbole	Her brother pushed past her to get more cake;	it was an assault of the worst kind.	Her brother didn't intend to attack her.
Literal	He had been involved in a crime;	it was an assault of the worst kind.	The crime he was involved in was a violent crime
8Metaphor	He came in here and broke all my dreams;	he was a terrorist of the worst kind.	
Hyperbole	The little baby was always breaking things;	he was a terrorist of the worst kind.	
Literal	The man who targeted the office block did an awful thing;	he was a terrorist of the worst kind.	
Metaphor	Having an argument affected my mood;	it had been vandalised very badly.	
Hyperbole	Someone had put a sticker on my new school bag;	it had been vandalised very	

		badly.	
Literal	The car parked outside my house was in a mess;	it had been vandalised very badly.	
Metaphor	My car is very nimble and efficient;	it is an athlete in fact.	
Hyperbole	Look, he is such a good worker, doing all that ironing;	he is an athlete in fact.	
Literal	The champion is extremely powerful and supple;	he is an athlete in fact.	
Metaphor	I am so hungry that my belly is making so much noise;	I have my own orchestra playing in here.	
Hyperbole	It is great when my two kids perform for me;	I have my own orchestra playing in here.	
Literal	I wanted to throw a party which would make a statement;	I have got my own orchestra playing in here.	
Metaphor	I am so tired of worrying, my mind has become empty;	it is a long dark corridor in there.	
Hyperbole	The living room is claustrophobic and depressing;	it is a long dark corridor in there.	
Literal	When you enter the main block, follow the signs;	it is a long dark corridor in there.	
Metaphor	I can't think because my brain isn't working anymore;	it is poached in hot water.	
Hyperbole	I have been in the bath too long and my toe is wrinkly;	it is poached in hot water.	
Literal	I will tell you what the best way to make a gammon is;	it is poached in hot water.	
Metaphor	I seem to always be carrying you around everywhere in my arms today;	I am your taxi today.	
Hyperbole	I have been giving you a lift everywhere today;	I am your taxi today.	

Literal	Hello, are you the man who ordered a lift to the airport?	I am your taxi today.	
8Metaphor	Our new flat had a big silver double fridge;	it was a monster; a huge one.	The fridge was much bigger than average.
Hyperbole	They found out which dog it was that attacked the child; It was a monster; a huge one.	it was a monster; a huge one.	The dog was ferocious and vicious.
Literal	The adventure storybook had one main character;	it was a monster; a huge one.	The character in the storybook was a big monster.
Metaphor	I can't take anymore, my confidence has gone;	it is smashed beyond repair.	Her confidence has been damaged.
Hyperbole	I won't be able to keep running because my knee is too bad;	it is smashed beyond repair.	Her knee is injured.
Literal	It was a shame that I knocked the jug off the table;	it is smashed beyond repair.	The jug is broken into pieces.
Metaphor	Easter eggs could tempt me from quitting chocolate because I love them so much;	they could be fatal in fact.	Easter eggs could bring an end to her commitment to giving up chocolate.
Hyperbole	Mum, these zits on my face are ruining everything;	they could be fatal in fact.	She feels that the zits on her face could ruin her life.
Literal	Certain conditions can be very serious if left untreated;	they could be fatal in fact.	Some illnesses and diseases end in death.
Metaphor	My family have come to be so much like me;	it is a big mirror now.	
Hyperbole	I spent so long polishing this vase and making it clean;	it is a big mirror now.	
Literal	I have got lots of antiques and my favourite one is always changing;	it is a big mirror now.	
Metaphor	My husband is too clingy and he is always hanging around me;	he is a backpack; a heavy one as well.	Her husband is quite needy.
Hyperbole	This new hand bag I have bought is too big.	it is a backpack; a heavy one as well.	Her handbag is not small and elegant.
Literal	I have bought something to take my books around in.	it is a backpack; a heavy one as well.	The backpack has shoulder straps.

Metaphor	Although it isn't well paid, I am happy with my first job;	it is scaffolding to get higher up.	His job is a good starting point.
Hyperbole	Why is that chair still in front of the window?	it is scaffolding to get higher up.	The chair is there to stand on.
Literal	They are staining our window so there is loads of stuff outside the door;	it is scaffolding to get higher up.	The scaffolding is made of metal
Metaphor	He left and took all his love with him;	he was a thief and nothing less.	
Hyperbole	My boyfriend was always grabbing the last chocolate;	he was a thief and nothing less.	
Literal	He grabbed a watch from a shop and didn't pay;	he was a thief and nothing less.	
Metaphor	People walk so fast along Oxford Street in London;	it is a motorway along there.	
Hyperbole	Vans go so quickly along our small residential street;	it is a motorway along there.	
Literal	The easiest way to get there was along the new route;	it is a motorway along there.	

B. Experiment 2: Word-naming experiment 1

1. Practice context sentences and probe words

Context sentence	**Probe word**
Alice likes to walk to the shops every morning to get some milk and the newspaper;	Routine
My daughter loves to dance around the kitchen listening to her favourite music;	Surprise
Becky was so good at swimming and moving through the water;	Fish
Tom smelt so bad because he didn't wash often enough;	Squirrel
It was almost impossible to eat those cakes you made yesterday;	Stone
I can hardly move after that race today;	Dead

2. Experimental context sentences and probe words

	Context sentence	**Probe**
Metaphor	My husband always manages to hide and block out all the negative things about life;	Curtain
Hyperbole	Thank goodness we have got that rug on the washing line to give us some shade;	Curtain
Literal	In the corner of the room, we have put some beautiful new cloth on a rail to make a concealed changing section;	Curtain
Metaphor	A politics degree gives you a better perspective on society;	Window
Hyperbole	John could see out of the hole in the wall he made for the gas pipe;	Window
Literal	There is a feature at the top of the stairs which lets so much sunshine into the big hall way;	Window
Metaphor	My mind is systematic, thorough and organised;	Computer
Hyperbole	My new microwave has so many buttons and switches which make it do so many different things;	Computer

Literal	There is always something which people become completely reliant on to do everything for them;	Computer
Metaphor	A good public school turns out an abundance of smartly dressed, polite and clever kids;	Factory
Hyperbole	When I bake cakes with my kids, we make so many in our tiny little kitchen;	Factory
Literal	Nearly everyone in my small town is employed in the same place;	Factory
Metaphor	Sometimes I think life is just all about showing off and seeing who is the most exuberant;	Exhibition
Hyperbole	Your desk is covered in so many scraps of paper with lovely doodles all over them;	Exhibition
Literal	There is a big cultural event going on in the entrance of the building;	Exhibition
Metaphor	Jimmy didn't want to go to secondary school and leave his lovely primary school behind;	Duvet
Hyperbole	Hannah didn't want to throw away her big, old, jumper;	Duvet
Literal	She had kept the same bedding nearly all her life;	Duvet
Metaphor	A privileged childhood can often conceal the harshness of reality;	Blindfold
Hyperbole	This skiing mask is steaming up all the time so I am very disorientated;	Blindfold
Literal	I am just going to put this on your face before the challenge starts;	Blindfold
8Metaphor	Tim's conscience was always making him feel bad and stopping him from doing things;	Dictator
Hyperbole	James' teacher was a serious and bossy man;	Dictator
Literal	Hitler was not a good leader;	Dictator
Metaphor	Look at all the brightly coloured fish swimming in the pond;	Festival
Hyperbole	I chose the nursery at the end of the road for my child because it is always	Festival

	full of fun and games;	
Literal	The village at the bottom of the valley has a big community gathering every year, with dancing and games;	Festival
Metaphor	Sam always got lost because the university was enormous;	Forest
Hyperbole	The back yard definitely needed pruning;	Forest
Literal	Sam and Mark went to a national park for the weekend;	Forest
Metaphor	The politician's style of politics was typical;	Noxious
Hyperbole	I had to drink earl grey and I hated it;	Noxious
Literal	The varnish he was using was a new brand;	Noxious
Metaphor	I really don't like that music band;	Mouldy
Hyperbole	I don't want to wear last year's dress;	Mouldy
Literal	I am cleaning the bathroom window sill;	Mouldy
Metaphor	The new novel by that young writer is so radical;	Blinding
Hyperbole	My new lamp is so powerful;	Blinding
Literal	Strong acid must not touch your face;	Blinding
Metaphor	Her big house was not a home anymore;	Cemetery
Hyperbole	They had said goodbye to so many pets in the garden;	Cemetery
Literal	They had developed the land next to the church;	Cemetery
Metaphor	The interview had been really hard;	Assault
Hyperbole	Her brother pushed past her to get more cake;	Assault
Literal	He had been involved in a crime;	Assault
8Metaphor	He came in here and broke all my dreams;	Terrorist

Hyperbole	The little baby was always breaking things;	Terrorist
Literal	The man who targeted the office block did an awful thing;	Terrorist
Metaphor	Having an argument affected my mood;	Vandalised
Hyperbole	Someone had put a sticker on my new school bag;	Vandalised
Literal	The car parked outside my house was in a mess;	Vandalised
Metaphor	My car is very nimble and efficient;	Athlete
Hyperbole	Look, he is such a good worker, doing all that ironing;	Athlete
Literal	The champion is extremely powerful and supple;	Athlete
Metaphor	I am so hungry that my belly is making so much noise;	Orchestra
Hyperbole	It is great when my two kids perform for me;	Orchestra
Literal	I wanted to throw a party which would make a statement;	Orchestra
Metaphor	I am so tired of worrying, my mind has become empty;	Corridor
Hyperbole	The living room is claustrophobic and depressing;	Corridor
Literal	When you enter the main block, follow the signs;	Corridor
Metaphor	I can’t think because my brain isn’t working anymore;	Poached
Hyperbole	I have been in the bath too long and my toe is wrinkly;	Poached
Literal	I will tell you what the best way to make a gammon is;	Poached
Metaphor	I seem to always be carrying you around everywhere in my arms today;	Taxi
Hyperbole	I have been giving you a lift everywhere today;	Taxi
Literal	Hello, are you the man who ordered a lift to the airport?	Taxi
8Metaphor	Our new flat had a big silver double fridge;	Monster

Hyperbole	They found out which dog it was that attacked the child;	Monster
Literal	The adventure storybook had one main character;	Monster
Metaphor	I can't take anymore, my confidence has gone;	Smashed
Hyperbole	I won't be able to keep running because my knee is too bad;	Smashed
Literal	It was a shame that I knocked the jug off the table;	Smashed
Metaphor	Easter eggs could tempt me from quitting chocolate because I love them so much;	Fatal
Hyperbole	Mum, these zits on my face are ruining everything;	Fatal
Literal	Certain conditions can be very serious if left untreated;	Fatal
Metaphor	My family have come to be so much like me;	Mirror
Hyperbole	I spent so long polishing this vase and making it clean;	Mirror
Literal	I have got lots of antiques and my favourite one is always changing;	Mirror
Metaphor	My husband is too clingy and he is always hanging around me;	Backpack
Hyperbole	This new hand bag I have bought is too big;	Backpack
Literal	I have bought something to take my books around in.	Backpack
Metaphor	Although it isn't well paid, I am happy with my first job;	Scaffolding
Hyperbole	Why is that chair still in front of the window?	Scaffolding
Literal	They are staining our window so there is loads of stuff outside the door;	Scaffolding
Metaphor	He left and took all his love with him;	Thief
Hyperbole	My boyfriend was always grabbing the last chocolate;	Thief
Literal	He grabbed a watch from a shop and didn't pay;	Thief
Metaphor	People walk so fast along Oxford Street in London;	Motorway

Hyperbole	Vans go so quickly along our small residential street;	Motorway
Literal	The easiest way to get there was along the new route;	Motorway

3. Filler context sentences and probe words

Context sentence	**Probe**
Vegetarians often find it hard to find exciting dishes to cook every evening;	Exhausting
Telling identical twins apart can be hard but mothers and fathers of twins often develop special tactics;	Challenging
I am forever loosing pens down the backs of sofas, in the bottom of bags;	Hopeless
I would quite like to go on holiday to America but it is very expensive;	Afford
Owning a car is expensive and not always necessary when you live in a big city like London;	Transport

My mum and dad are coming to visit this weekend;	Exciting
There was a shard of glass on the street;	Jagged
There was an enourmous cake on the table;	Delicious
The saucepan was shiney and clean;	Smart
Apricots can be dried to make a snack;	Nice
Alison always wears red trousers;	Best
The tiger was wandering around its cage;	Sad
I always wanted to try different foods when I was young;	Interested
Happy people always get on better in life;	Aspirational
A bottle of water is easy to carry around;	Little

The curtains will be drawn at midnight; ok.	Regulations
Having a hood on your coat is imortant when it rains;	Defence
Children love christmas time because they get presents;	Magical
Apples are better for you than bananas;	Nutrients
Giant ants live in the amazin rainforest;	Bugs
John was never delicate about the way he dealt with people's worries and problems;	Bulldozer
Amy had become so greedy when she was eating;	Pig
Jane was a malicious and unkind in the meeting this afternoon;	Witch
Helen's teacher always got angry for no reason and shouted at everyone;	Dragon
Mary's daughter was such a good girl and always helped her do the washing;	Angel
Tim's new car was very fast and could pull away from traffic lights very quickly;	Spaceship
Alex's mum was fed up of having to ask him to tidy his room;	Cess Pit
Today was a horrible day from start to finish;	Horror film
My new job is so fun and interesting I can hardly believe it;	Fantasy
Sarah's friend was always trying to cheat on the weekly spelling test by looking over her shoulder and copying her answers;	Crocodile
Little Matthew was so fast at running that he beat all of the other children on sports day;	Gun shot
Daniel's life was full of drama, happiness and tragedy;	Drama
Sam was a good friend who was always there to support his best mates;	Pillar
Thomas' was so in love with his fiancé and believed she was a rare and exceptional woman;	Ruby
Scott loved to go jogging in the evenings to keep fit and he was actually quite fast;	Leopard
Tom can't wait to replace his old car as it has become a bit rusty and unreliable;	Drum

We really need to smarten up and renovate our garden;	Dung heap
I hate my school because it is a horrible and depressing building which I have to go to every day;	Jail
That little boy that lives next door is a grubby, naughty little thing;	Mouse
I have been looking for that rare copy of that book for so long that I can't belive I have got it now;	Treasure
That puddle that has formed in the middle of the playground is huge;	Lake
The cold weather has made the roads so dangerous;	Ice rink
I can't walk up this street with all these shopping bags it is too steep;	Mountain
I can't believe how tall your dad is;	Giant
This cup of tea is too hot for me to drink;	Boiling
I can't believe how cold it is in my bedroom;	Icy
I am so tired after such a busy day;	Running
Can you make sure you draw the shower curtain next time you shower because there is water all over the floor every time you shower;	Swimming
I felt fitter on my morning jog today;	Flying
I managed to jump so high over that log;	Sailed
Your house is so big and spacious;	Palace
I ran around my usual running route so fast this morning;	Performance
That cheese on toast was just what I wanted;	Banquet
The car hit me so hard as I was cycling along;	Shot
This path is so muddy along here;	Wading
He was drinking wine out of such a large glass;	Bath

There was a woman in the park lying in the sun for so long;	Grilling
June spent so much time sunbathing when she was young that now here skin is very damaged;	Canvas
Hannah has become so thin that I am starting to get worried about her;	Bones
It is so hot in this shop that I am going to have to leave;	Baking

C. Experiment 3: Word-naming experiment 2

1. Practice trial target sentences, context sentences, probe words and comprehension statements

Context and target sentence	Probe word	Comprehension statement
Alice likes to walk to the shops every morning to get some milk and the newspaper; it is her routine these days.	Routine	Having a routine keeps you organized.
My daughter loves to dance around the kitchen listening to her favourite music; it is a joy to watch her.	Surprise	
Becky was so good at swimming and moving through the water; she is a fish, I would say.	Fish	Fish live in water
Tom smelt so bad because he didn't wash often enough; he was a skunk, most people thought.	Squirrel	
It was almost impossible to eat those cakes you made yesterday; they were concrete in your mouth.	Stone	Concrete is hard
I can hardly move after that race today; I am dead now.	Dead	

2. Experimental target sentences, context sentences, probe words, and comprehension statements.

	Context and target sentence	Probe	Comprehension statement
Metaphor	My husband always manages to hide and block out all the negative things about life; He is a curtain to hide behind.	Curtain	Her husband protects me.
Hyperbole	Thank goodness we have got that rug on the washing line to give us some shade; it is a curtain to hide behind.	Curtain	The rug blocked out the sun.
Literal	In the corner of the room, we have put some beautiful new cloth on a rail to make a concealed changing section; it is a curtain to hide behind.	Curtain	The curtain is made of cloth.
Metaphor	A politics degree gives you a better perspective on society; it is a window to look out of.	Window	A politics degree teaches you about society.

Hyperbole	John could see out of the hole in the wall he made for the gas pipe; it was a window to look out of.	Window	There was no glass in the window.
Literal	There is a feature at the top of the stairs which lets so much sunshine into the big hall way; it is a window to look out of.	Window	You could see out of the window.
Metaphor	My mind is systematic, thorough and organised; it is my computer these days.	Computer	My brain is good at processing.
Hyperbole	My new microwave has so many buttons and switches which make it do so many different things; it is a computer these days.	Computer	My microwave is very modern and sophisticated.
Literal	There is always something which people become completely reliant on to do everything for them; it is a computer these days.	Computer	We are reliant on computers these days.
Metaphor	A good public school turns out an abundance of smartly dressed, polite and clever kids; it is a factory making products.	Factory	The school consistently produces very good students.
Hyperbole	When I bake cakes with my kids, we make so many in our tiny little kitchen; it is a factory making products.	Factory	The kids are good helpers.
Literal	Nearly everyone in my small town is employed in the same place; it is a factory making products.	Factory	The factory employs lots of people.
Metaphor	Sometimes I think life is just all about showing off and seeing who is the most exuberant; it is an exhibition of an artists' work.	Exhibition	Life can be about proving yourself and being competitive.
Hyperbole	Your desk is covered in so many scraps of paper with lovely doodles all over them; it is an exhibition of an artists' work.	Exhibition	She has drawn lots of doodles.
Literal	There is a big cultural event going on in the entrance of the building; it is an exhibition of an artists' work.	Exhibition	The exhibition will display artists' work.
Metaphor	Jimmy didn't want to go to secondary school and leave his lovely primary school behind; it had been his duvet for years.	Duvet	
Hyperbole	Hannah didn't want to throw away her big, old,	Duvet	

	jumper; it has been her duvet for years.		
Literal	She had kept the same bedding nearly all her life; it had been her duvet for years.	Duvet	
Metaphor	A privileged childhood can often conceal the harshness of reality; it is a blindfold that stops you seeing.	Blindfold	
Hyperbole	This skiing mask is steaming up all the time so I am very disorientated; it is a blindfold that stops you seeing.	Blindfold	
Literal	I am just going to put this on your face before the challenge starts; it is a blindfold that stops you seeing.	Blindfold	
8Metaphor	Tim's conscience was always making him feel bad and stopping him from doing things; it was a dictator of the worst kind.	Dictator	
Hyperbole	James' teacher was a serious and bossy man; he was a dictator of the worst kind.	Dictator	
Literal	Hitler was not a good leader; he was a dictator of the worst kind.	Dictator	
Metaphor	Look at all the brightly coloured fish swimming in the pond; it is a festival down there.	Festival	The fish were shining brightly in the water.
Hyperbole	I chose the nursery at the end of the road for my child because it is always full of fun and games; it is a festival down there.	Festival	The children always have lots of fun at the nursery.
Literal	The village at the bottom of the valley has a big community gathering every year, with dancing and games; it is a festival down there.	Festival	Festivals are fun and happy events.
Metaphor	Sam always got lost because the university was enormous; it was a forest with winding paths.	Forest	The university was big and confusing.
Hyperbole	The back yard definitely needed pruning; it was a forest with winding paths.	Forest	The back yard had become overgrown.
Literal	Sam and Mark went to a national park for the weekend; it was a forest with winding paths.	Forest	There are lots of trees in the national park.

Metaphor	The politician's style of politics was typical; it was noxious and disgusting.	Noxious	He was not a fair and honest politician.
Hyperbole	I had to drink earl grey and I hated it; it was noxious and disgusting.	Noxious	The tea tasted bad.
Literal	The varnish he was using was a new brand; it was noxious and disgusting.	Noxious	The varnish smelt bad.
Metaphor	I really don't like that music band; it is mouldy and I hate it.	Mouldy	She thought the music band was out of date and bad.
Hyperbole	I don't want to wear last year's dress; it is mouldy and I hate it.	Mouldy	Her dress was out of date and unfashionable.
Literal	I am cleaning the bathroom window sill; It is mouldy and I hate it.	Mouldy	The bathroom windowsill is damp and dirty.
Metaphor	The new novel by that young writer is so radical; It is blinding and dangerous.	Blinding	The new novel is different to most novels around today.
Hyperbole	My new lamp is so powerful; It is blinding and dangerous.	Blinding	The light is far too bright.
Literal	Strong acid must not touch your face; It is blinding and dangerous.	Blinding	Acid can cause permanent loss of sight.
Metaphor	Her big house was not a home anymore; It was a cemetery now.	Cemetery	Her house felt sad and empty.
Hyperbole	They had said goodbye to so many pets in the garden; It was a cemetery now.	Cemetery	There were lots of animals buried in the garden.
Literal	They had developed the land next to the church; It was a cemetery now.	Cemetery	The land next to the church was used for burying people.
Metaphor	The interview had been really hard; It was an assault of the worst kind.	Assault	He wasn't physically wounded in the interview.
Hyperbole	Her brother pushed past her to get more cake; It was an assault of the worst kind.	Assault	Her brother didn't intend to attack her.
Literal	He had been involved in a crime; It was an assault of the worst kind.	Assault	The crime he was involved in was a violent crime

Metaphor	He came in here and broke all my dreams; He was a terrorist of the worst kind.	Terrorist	
Hyperbole	The little baby was always breaking things; He was a terrorist of the worst kind.	Terrorist	
Literal	The man who targeted the office block did an awful thing; He was a terrorist of the worst kind.	Terrorist	
Metaphor	Having an argument affected my mood; It had been vandalised very badly.	Vandalised	
Hyperbole	Someone had put a sticker on my new school bag; It had been vandalised very badly.	Vandalised	
Literal	The car parked outside my house was in a mess; It had been vandalised very badly.	Vandalised	
Metaphor	My car is very nimble and efficient; It is an athlete in fact.	Athlete	
Hyperbole	Look, he is such a good worker, doing all that ironing; He is an athlete in fact.	Athlete	
Literal	The champion is extremely powerful and supple; He is an athlete in fact.	Athlete	
Metaphor	I am so hungry that my belly is making so much noise; I have my own orchestra playing in here.	Orchestra	
Hyperbole	It is great when my two kids perform for me; I have my own orchestra playing in here.	Orchestra	
Literal	I wanted to throw a party which would make a statement; I have got my own orchestra playing in here.	Orchestra	
Metaphor	I am so tired of worrying, my mind has become empty; It is a long dark corridor in there.	Corridor	
Hyperbole	The living room is claustrophobic and depressing; It is a long dark corridor in there.	Corridor	
Literal	When you enter the main block, follow the signs; It is a long dark corridor in there.	Corridor	

Metaphor	I can't think because my brain isn't working anymore; It is poached in hot water.	Poached	
Hyperbole	I have been in the bath too long and my toe is wrinkly; It is poached in hot water.	Poached	
Literal	I will tell you what the best way to make a gammon is; It is poached in hot water.	Poached	
Metaphor	I seem to always be carrying you around everywhere in my arms today; I am your taxi today.	Taxi	
Hyperbole	I have been giving you a lift everywhere today; I am your taxi today.	Taxi	
Literal	Hello, are you the man who ordered a lift to the airport? I am your taxi today.	Taxi	
8Metaphor	Our new flat had a big silver double fridge; It was a monster; a huge one.	Monster	The fridge was much bigger than average.
Hyperbole	They found out which dog it was that attacked the child; It was a monster; a huge one.	Monster	The dog was ferocious and vicious.
Literal	The adventure storybook had one main character; It was a monster; a huge one.	Monster	The character in the storybook was a big monster.
Metaphor	I can't take anymore, my confidence has gone; It is smashed beyond repair.	Smashed	Her confidence has been damaged.
Hyperbole	I won't be able to keep running because my knee is too bad; It is smashed beyond repair.	Smashed	Her knee is injured.
Literal	It was a shame that I knocked the jug off the table; It is smashed beyond repair.	Smashed	The jug is broken into pieces.
Metaphor	Easter eggs could tempt me from quitting chocolate because I love them so much; They could be fatal in fact.	Fatal	Easter eggs could bring an end to her commitment to giving up chocolate.
Hyperbole	Mum, these zits on my face are ruining everything; They could be fatal in fact.	Fatal	She feels that the zits on her face could ruin her life.
Literal	Certain conditions can be very serious if left untreated; They could be fatal in fact.	Fatal	Some illnesses and diseases end in death.

Metaphor	My family have come to be so much like me; It is a big mirror now.	Mirror	
Hyperbole	I spent so long polishing this vase and making it clean; It is a big mirror now.	Mirror	
Literal	I have got lots of antiques and my favourite one is always changing; It is a big mirror now.	Mirror	
Metaphor	My husband is too clingy and he is always hanging around me; He is a backpack; a heavy one as well.	Backpack	Her husband is quite needy.
Hyperbole	This new hand bag I have bought is too big. It is a backpack; a heavy one as well.	Backpack	Her handbag is not small and elegant.
Literal	I have bought something to take my books around in. It is a backpack; a heavy one as well.	Backpack	The backpack has shoulder straps.
Metaphor	Although it isn't well paid, I am happy with my first job; It is scaffolding to get higher up.	Scaffolding	His job is a good starting point.
Hyperbole	Why is that chair still in front of the window? It is scaffolding to get higher up.	Scaffolding	The chair is there to stand on.
Literal	They are staining our window so there is loads of stuff outside the door; It is scaffolding to get higher up.	Scaffolding	The scaffolding is made of metal
Metaphor	He left and took all his love with him; he was a thief and nothing less.	Thief	
Hyperbole	My boyfriend was always grabbing the last chocolate; he was a thief and nothing less.	Thief	
Literal	He grabbed a watch from a shop and didn't pay; he was a thief and nothing less.	Thief	
Metaphor	People walk so fast along Oxford Street in London; it is a motorway along there.	Motorway	
Hyperbole	Vans go so quickly along our small residential street; it is a motorway along there.	Motorway	
Literal	The easiest way to get there was along the new route; it is a motorway along there.	Motorway	

3. Filler target sentences, context sentences, probe words, and comprehension statements

Context and target sentences	Probe word	Comp statement
Vegetarians often find it hard to find exciting dishes to cook every evening; it can be exhausting and boring.	Exhausting	
Telling identical twins apart can be hard but mothers and fathers of twins often develop special tactics; it is challenging though.	Challenging	Identical twins look the same
I am forever loosing pens down the backs of sofas, in the bottom of bags; I am hopeless these days.	Hopeless	
I would quite like to go on holiday to America but it is very expensive; I don't think I can afford it actually.	Afford	She hasn't got enough money to go to America
Owning a car is expensive and not always necessary when you live in a big city like London; it has fantastic public transport these days.	Transport	

My mum and dad are coming to visit this weekend; it will be fun I think.	Exciting	She is not looking forward to her parents visiting.
There was a shard of glass on the street; It was sharp and dangerous.	Jagged	
There was an enourmous cake on the table; It was chocolate and rich.	Delicious	Chocolate cake is sweet
The saucepan was shiney and clean; It is new from the store.	Smart	
Apricots can be dried to make a snack; They are delicious and healthy.	Nice	Dried apricots can't be eaten.
Alison always wears red trousers; they are her favourite piece of clothing.	Best	
The tiger was wandering around its cage; It was bored and restless.	Sad	Tigers get more exercise in the wild.

I always wanted to try different foods when I was young; I was adventurous back then.	Interested	
Happy people always get on better in life; They are ambitious wich helps.	Aspirational	Happy people are more successful than sad people
A bottle of water is easy to carry around; It is light and small.	Little	
The curtains will be drawn at midnight; These are the rules ok.	Regulations	There are no rules about when to draw the curtains.
Having a hood on your coat is imortant when it rains; It is protection from the weather.	Defence	
Children love christmas time because they get presents; It is exciting and fun.	Magical	Children hate Christmas because only adults get presents.
Apples are better for you than bananas; They have more vitamins and minerals.	Nutrients	
Giant ants live in the amazin rainforest; They are insects you know.	Bugs	Giant ants live in England.
John was never delicate about the way he dealt with people's worries and problems; he was a bulldozer these days.	Bulldozer	John was clumsy and destructive.
Amy had become so greedy when she was eating; she was a pig back then.	Pig	
Jane was a malicious and unkind in the meeting this afternoon; she was witch today.	Witch	Jane is a kind person.
Helen's teacher always got angry for no reason and shouted at everyone; she was a dragon to the children.	Dragon	Helen's teacher was soft and never got angry.
Mary's daughter was such a good girl and always helped her do the washing; she was an angel and very sweet.	Angel	
Tim's new car was very fast and could pull away from traffic lights very quickly; it was a rocket which could fly.	Spaceship	
Alex's mum was fed up of having to ask him to tidy his room; it was a pig sty these days.	Cess Pit	Alex's room was messy and dirty

Today was a horrible day from start to finish; it was a nightmare of the worst kind.	Horror film	
My new job is so fun and interesting I can hardly believe it; it is a dream which isn't real.	Fantasy	
Sarah's friend was always trying to cheat on the weekly spelling test by looking over her shoulder and copying her answers; she was a snake for doing that.	Crocodile	
Little Matthew was so fast at running that he beat all of the other children on sports day; he was a bullet that day.	Gun shot	Bullets shot from a gun move very quickly like Mathew
Daniel's life was full of drama, happiness and tragedy; it was a novel which was long and complicated.	Drama	
Sam was a good friend who was always there to support his best mates; he was a tree which stood strong.	Pillar	Trees are hard and strong which make them supportive like Sam
Thomas' was so in love with his fiancé and believed she was a rare and exceptional woman; she was a diamond to him.	Ruby	
Scott loved to go jogging in the evenings to keep fit and he was actually quite fast; he was a cheetah these days.	Leopard	Leopards run very slowly.
Tom can't wait to replace his old car as it has become a bit rusty and unreliable; it is an old tin can these days.	Drum	Old tin cans are rubbish and ugly like Tom's car
We really need to smarten up and renovate our garden; it is a rubbish dump these days.	Dung heap	Rubbish dumps are attractive and beautiful places.
I hate my school because it is a horrible and depressing building which I have to go to every day; it is a prison I would say.	Jail	Prisons are pleasant and give you a sense of freedom.
That little boy that lives next door is a grubby , naughty little thing; he is a little rat scurrying around.	Mouse	
I have been looking for that rare copy of that book for so long that I can't belive I have got it now; it is gold in my pocket.	Treasure	
That puddle that has formed in the middle of the playground is huge; it is a lake now.	Lake	Lakes are large areas of water.
The cold weather has made the roads so dangerous; it is an ice rink out there.	Ice rink	Ice rinks are slippery.

I can't walk up this street with all these shopping bags it is too steep; it is a mountain up here.	Mountain	
I can't believe how tall your dad is; he is a giant man.	Giant	
This cup of tea is too hot for me to drink; it is boiling in my mouth.	Boiling	The tea has become too cold
I can't believe how cold it is in my bedroom; it is freezing in here.	Icy	
I am so tired after such a busy day; I have been racing around too much.	Running	
Can you make sure you draw the shower curtain next time you shower because there is water all over the floor every time you shower; I am floating in here.	Swimming	
I felt fitter on my morning jog today; I was sprinting the whole way.	Flying	
I managed to jump so high over that log; I flew through the air.	Sailed	
Your house is so big and spacious; it is a castle in here.	Palace	The house was very small
I ran around my usual running route so fast this morning; it was a world record I bet.	Performance	
That cheese on toast was just what I wanted; it was a feast to remember.	Banquet	
The car hit me so hard as I was cycling along; I was catapulted through the air.	Shot	
This path is so muddy along here; I am sinking deeper.	Wading	The path was very dry
He was drinking wine out of such a large glass; it was a bucket of wine.	Bath	His glass of wine was bigger than the average
There was a woman in the park lying in the sun for so long; she was frying out there.	Grilling	The woman was not lying in the sun long enough to get burnt
June spent so much time sunbathing when she was young that now here skin is very damaged; it is leather now.	Canvas	Her skin no longer looks attractive

Hannah has become so thin that I am starting to get worried about her; she is a skeleton now.	Bones	Hannah is quite fat
It is so hot in this shop that I am going to have to leave; I am roasting in here.	Baking	He is uncomfortably hot

D. Experiment 4: Eye-tracking experiment

1. Practice trial target, context sentences, and comprehension statements

Context and target sentence	Comprehension statement
Alice likes to walk to the shops every morning to get some milk and the newspaper; it is her routine these days.	Having a routine keeps you organized.
My daughter loves to dance around the kitchen listening to her favourite music; it is a joy to watch her.	
Becky was so good at swimming and moving through the water; she is a fish, I would say.	Fish live in water
Tom smelt so bad because he didn't wash often enough; he was a skunk, most people thought.	
It was almost impossible to eat those cakes you made yesterday; they were concrete in your mouth.	Concrete is hard
I can hardly move after that race today; I am dead now.	

2. Experimental target, context sentences, and comprehension statements

	Context and target sentence	Comprehension statement
Metaphor	My husband always manages to hide and block out all the negative things about life; He is a curtain to hide behind.	Her husband protects me.
Hyperbole	Thank goodness we have got that rug on the washing line to give us some shade; it is a curtain to hide behind.	The rug blocked out the sun.
Literal	In the corner of the room, we have put some beautiful new cloth on a rail to make a concealed changing section; it is a curtain to hide behind.	The curtain is made of cloth.
Metaphor	A politics degree gives you a better perspective on society; it is a window to look out of.	A politics degree teaches you about society.

Hyperbole	John could see out of the hole in the wall he made for the gas pipe; it was a window to look out of.	There was no glass in the window.
Literal	There is a feature at the top of the stairs which lets so much sunshine into the big hall way; it is a window to look out of.	You could see out of the window.
Metaphor	My mind is systematic, thorough and organised; it is my computer these days.	My brain is good at processing.
Hyperbole	My new microwave has so many buttons and switches which make it do so many different things; it is a computer these days.	My microwave is very modern and sophisticated.
Literal	There is always something which people become completely reliant on to do everything for them; it is a computer these days.	We are reliant on computers these days.
Metaphor	A good public school turns out an abundance of smartly dressed, polite and clever kids; it is a factory making products.	The school consistently produces very good students.
Hyperbole	When I bake cakes with my kids, we make so many in our tiny little kitchen; it is a factory making products.	The kids are good helpers.
Literal	Nearly everyone in my small town is employed in the same place; it is a factory making products.	The factory employs lots of people.
Metaphor	Sometimes I think life is just all about showing off and seeing who is the most exuberant; it is an exhibition of an artists' work.	Life can be about proving yourself and being competitive.
Hyperbole	Your desk is covered in so many scraps of paper with lovely doodles all over them; it is an exhibition of an artists' work.	She has drawn lots of doodles.
Literal	There is a big cultural event going on in the entrance of the building; it is an exhibition of an artists' work.	The exhibition will display artists' work.
Metaphor	Jimmy didn't want to go to secondary school and leave his lovely primary school behind; it	

	had been his duvet for years.	
Hyperbole	Hannah didn't want to throw away her big, old, jumper; it has been her duvet for years.	
Literal	She had kept the same bedding nearly all her life; it had been her duvet for years.	
Metaphor	A privileged childhood can often conceal the harshness of reality; it is a blindfold that stops you seeing.	
Hyperbole	This skiing mask is steaming up all the time so I am very disorientated; it is a blindfold that stops you seeing.	
Literal	I am just going to put this on your face before the challenge starts; it is a blindfold that stops you seeing.	
8Metaphor	Tim's conscience was always making him feel bad and stopping him from doing things; it was a dictator of the worst kind.	
Hyperbole	James' teacher was a serious and bossy man; he was a dictator of the worst kind.	
Literal	Hitler was not a good leader; he was a dictator of the worst kind.	
Metaphor	Look at all the brightly coloured fish swimming in the pond; it is a festival down there.	The fish were shining brightly in the water.
Hyperbole	I chose the nursery at the end of the road for my child because it is always full of fun and games; it is a festival down there.	The children always have lots of fun at the nursery.
Literal	The village at the bottom of the valley has a big community gathering every year, with dancing and games; it is a festival down there.	Festivals are fun and happy events.
Metaphor	Sam always got lost because the university was enormous; it was a forest with winding paths.	The university was big and confusing.
Hyperbole	The back yard definitely needed pruning; it	The back yard had become overgrown.

	was a forest with winding paths.	
Literal	Sam and Mark went to a national park for the weekend; it was a forest with winding paths.	There are lots of trees in the national park.
Metaphor	The politician's style of politics was typical; it was noxious and disgusting.	He was not a fair and honest politician.
Hyperbole	I had to drink earl grey and I hated it; it was noxious and disgusting.	The tea tasted bad.
Literal	The varnish he was using was a new brand; it was noxious and disgusting.	The varnish smelt bad.
Metaphor	I really don't like that music band; it is mouldy and I hate it.	She thought the music band was out of date and bad.
Hyperbole	I don't want to wear last year's dress; it is mouldy and I hate it.	Her dress was out of date and unfashionable.
Literal	I am cleaning the bathroom window sill; It is mouldy and I hate it.	The bathroom windowsill is damp and dirty.
Metaphor	The new novel by that young writer is so radical; It is blinding and dangerous.	The new novel is different to most novels around today.
Hyperbole	My new lamp is so powerful; It is blinding and dangerous.	The light is far too bright.
Literal	Strong acid must not touch your face; It is blinding and dangerous.	Acid can cause permanent loss of sight.
Metaphor	Her big house was not a home anymore; It was a cemetery now.	Her house felt sad and empty.
Hyperbole	They had said goodbye to so many pets in the garden; It was a cemetery now.	There were lots of animals buried in the garden.
Literal	They had developed the land next to the church; It was a cemetery now.	The land next to the church was used for burying people.
Metaphor	The interview had been really hard; It was an assault of the worst kind.	He wasn't physically wounded in the interview.

Hyperbole	Her brother pushed past her to get more cake; It was an assault of the worst kind.	Her brother didn't intend to attack her.
Literal	He had been involved in a crime; It was an assault of the worst kind.	The crime he was involved in was a violent crime
8Metaphor	He came in here and broke all my dreams; He was a terrorist of the worst kind.	
Hyperbole	The little baby was always breaking things; He was a terrorist of the worst kind.	
Literal	The man who targeted the office block did an awful thing; He was a terrorist of the worst kind.	
Metaphor	Having an argument affected my mood; It had been vandalised very badly.	
Hyperbole	Someone had put a sticker on my new school bag; It had been vandalised very badly.	
Literal	The car parked outside my house was in a mess; It had been vandalised very badly.	
Metaphor	My car is very nimble and efficient; It is an athlete in fact.	
Hyperbole	Look, he is such a good worker, doing all that ironing; He is an athlete in fact.	
Literal	The champion is extremely powerful and supple; He is an athlete in fact.	
Metaphor	I am so hungry that my belly is making so much noise; I have my own orchestra playing in here.	
Hyperbole	It is great when my two kids perform for me; I have my own orchestra playing in here.	
Literal	I wanted to throw a party which would make a statement; I have got my own orchestra playing in here.	
Metaphor	I am so tired of worrying, my mind has become empty; It is a long dark corridor in	

	there.	
Hyperbole	The living room is claustrophobic and depressing; It is a long dark corridor in there.	
Literal	When you enter the main block, follow the signs; It is a long dark corridor in there.	
Metaphor	I can't think because my brain isn't working anymore; It is poached in hot water.	
Hyperbole	I have been in the bath too long and my toe is wrinkly; It is poached in hot water.	
Literal	I will tell you what the best way to make a gammon is; It is poached in hot water.	
Metaphor	I seem to always be carrying you around everywhere in my arms today; I am your taxi today.	
Hyperbole	I have been giving you a lift everywhere today; I am your taxi today.	
Literal	Hello, are you the man who ordered a lift to the airport? I am your taxi today.	
8Metaphor	Our new flat had a big silver double fridge; It was a monster; a huge one.	The fridge was much bigger than average.
Hyperbole	They found out which dog it was that attacked the child; It was a monster; a huge one.	The dog was ferocious and vicious.
Literal	The adventure storybook had one main character; It was a monster; a huge one.	The character in the storybook was a big monster.
Metaphor	I can't take anymore, my confidence has gone; It is smashed beyond repair.	Her confidence has been damaged.
Hyperbole	I won't be able to keep running because my knee is too bad; It is smashed beyond repair.	Her knee is injured.
Literal	It was a shame that I knocked the jug off the table; It is smashed beyond repair.	The jug is broken into pieces.

Metaphor	Easter eggs could tempt me from quitting chocolate because I love them so much; They could be fatal in fact.	Easter eggs could bring an end to her commitment to giving up chocolate.
Hyperbole	Mum, these zits on my face are ruining everything; They could be fatal in fact.	She feels that the zits on her face could ruin her life.
Literal	Certain conditions can be very serious if left untreated; They could be fatal in fact.	Some illnesses and diseases end in death.
Metaphor	My family have come to be so much like me; It is a big mirror now.	
Hyperbole	I spent so long polishing this vase and making it clean; It is a big mirror now.	
Literal	I have got lots of antiques and my favourite one is always changing; It is a big mirror now.	
Metaphor	My husband is too clingy and he is always hanging around me; He is a backpack; a heavy one as well.	Her husband is quite needy.
Hyperbole	This new hand bag I have bought is too big. It is a backpack; a heavy one as well.	Her handbag is not small and elegant.
Literal	I have bought something to take my books around in. It is a backpack; a heavy one as well.	The backpack has shoulder straps.
Metaphor	Although it isn't well paid, I am happy with my first job; It is scaffolding to get higher up.	His job is a good starting point.
Hyperbole	Why is that chair still in front of the window? It is scaffolding to get higher up.	The chair is there to stand on.
Literal	They are staining our window so there is loads of stuff outside the door; It is scaffolding to get higher up.	The scaffolding is made of metal
Metaphor	He left and took all his love with him; he was a thief and nothing less.	
Hyperbole	My boyfriend was always grabbing the last chocolate; he was a thief and nothing less.	

Literal	He grabbed a watch from a shop and didn't pay; he was a thief and nothing less.	
Metaphor	People walk so fast along Oxford Street in London; it is a motorway along there.	
Hyperbole	Vans go so quickly along our small residential street; it is a motorway along there.	
Literal	The easiest way to get there was along the new route; it is a motorway along there.	

3. Filler context sentences, target sentences, and comprehension statements

Context and target sentences	**Comp statement**
Vegetarians often find it hard to find exciting dishes to cook every evening; it can be exhausting and boring.	
Telling identical twins apart can be hard but mothers and fathers of twins often develop special tactics; it is challenging though.	Identical twins look the same
I am forever loosing pens down the backs of sofas, in the bottom of bags; I am hopeless these days.	
I would quite like to go on holiday to America but it is very expensive; I don't think I can afford it actually.	She hasn't got enough money to go to America
Owning a car is expensive and not always necessary when you live in a big city like London; it has fantastic public transport these days.	

My mum and dad are coming to visit this weekend; it will be fun I think.	She is not looking forward to her parents visiting.
There was a shard of glass on the street; It was sharp and dangerous.	
There was an enourmous cake on the table; It was chocolate and rich.	Chocolate cake is sweet
The saucepan was shiney and clean; It is new from the store.	
Apricots can be dried to make a snack; They are delicious and healthy.	Dried apricots can't be eaten.

Alison always wears red trousers; they are her favourite piece of clothing.	
The tiger was wandering around its cage; It was bored and restless.	Tigers get more exercise in the wild.
I always wanted to try different foods when I was young; I was adventurous back then.	
Happy people always get on better in life; They are ambitious wich helps.	Happy people are more successful than sad people
A bottle of water is easy to carry around; It is light and small.	
The curtains will be drawn at midnight; These are the rules ok.	There are no rules about when to draw the curtains.
Having a hood on your coat is imortant when it rains; It is protection from the weather.	
Children love christmas time because they get presents; It is exciting and fun.	Children hate Christmas because only adults get presents.
Apples are better for you than bananas; They have more vitamins and minerals.	
Giant ants live in the amazin rainforest; They are insects you know.	Giant ants live in England.
John was never delicate about the way he dealt with people's worries and problems; he was a bulldozer these days.	John was clumsy and destructive.
Amy had become so greedy when she was eating; she was a pig back then.	
Jane was a malicious and unkind in the meeting this afternoon; she was witch today.	Jane is a kind person.
Helen's teacher always got angry for no reason and shouted at everyone; she was a dragon to the children.	Helen's teacher was soft and never got angry.
Mary's daughter was such a good girl and always helped her do the washing; she was an angel and very sweet.	
Tim's new car was very fast and could pull away from traffic lights very quickly; it was a rocket which could fly.	

Alex's mum was fed up of having to ask him to tidy his room; it was a pig sty these days.	Alex's room was messy and dirty
Today was a horrible day from start to finish; it was a nightmare of the worst kind.	
My new job is so fun and interesting I can hardly believe it; it is a dream which isn't real.	
Sarah's friend was always trying to cheat on the weekly spelling test by looking over her shoulder and copying her answers; she was a snake for doing that.	
Little Matthew was so fast at running that he beat all of the other children on sports day; he was a bullet that day.	Bullets shot from a gun move very quickly like Mathew
Daniel's life was full of drama, happiness and tragedy; it was a novel which was long and complicated.	
Sam was a good friend who was always there to support his best mates; he was a tree which stood strong.	Trees are hard and strong which make them supportive like Sam
Thomas' was so in love with his fiancé and believed she was a rare and exceptional woman; she was a diamond to him.	
Scott loved to go jogging in the evenings to keep fit and he was actually quite fast; he was a cheetah these days.	Leopards run very slowly.
Tom can't wait to replace his old car as it has become a bit rusty and unreliable; it is an old tin can these days.	Old tin cans are rubbish and ugly like Tom's car
We really need to smarten up and renovate our garden; it is a rubbish dump these days.	Rubbish dumps are attractive and beautiful places.
I hate my school because it is a horrible and depressing building which I have to go to every day; it is a prison I would say.	Prisons are pleasant and give you a sense of freedom.
That little boy that lives next door is a grubby , naughty little thing; he is a little rat scurrying around.	
I have been looking for that rare copy of that book for so long that I can't belive I have got it now; it is gold in my pocket.	
That puddle that has formed in the middle of the playground is huge; it is a lake now.	Lakes are large areas of water.

The cold weather has made the roads so dangerous; it is an ice rink out there.	Ice rinks are slippery.
I can't walk up this street with all these shopping bags it is too steep; it is a mountain up here.	
I can't believe how tall your dad is; he is a giant man.	
This cup of tea is too hot for me to drink; it is boiling in my mouth.	The tea has become too cold
I can't believe how cold it is in my bedroom; it is freezing in here.	
I am so tired after such a busy day; I have been racing around too much.	
Can you make sure you draw the shower curtain next time you shower because there is water all over the floor every time you shower; I am floating in here.	
I felt fitter on my morning jog today; I was sprinting the whole way.	
I managed to jump so high over that log; I flew through the air.	
Your house is so big and spacious; it is a castle in here.	The house was very small
I ran around my usual running route so fast this morning; it was a world record I bet.	
That cheese on toast was just what I wanted; it was a feast to remember.	
The car hit me so hard as I was cycling along; I was catapulted through the air.	
This path is so muddy along here; I am sinking deeper.	The path was very dry
He was drinking wine out of such a large glass; it was a bucket of wine.	His glass of wine was bigger than the average
There was a woman in the park lying in the sun for so long; she was frying out there.	The woman was not lying in the sun long enough to get burnt
June spent so much time sunbathing when she was young that now here skin is very damaged; it is leather now.	Her skin no longer looks attractive

Hannah has become so thin that I am starting to get worried about her; she is a skeleton now.	Hannah is quite fat
It is so hot in this shop that I am going to have to leave; I am roasting in here.	He is uncomfortably hot

E. Experiment 5: Developmental experiment 1 and 2

1. Metaphor and hyperbole stories

Metaphor 1	It's Sunday afternoon, and Alex is playing outside in the fresh air. Today, Alex is a monkey. Can you find the picture in which Alex is a monkey?
Metaphor 2	This weekend, Harry is going on holiday with his Daddy. Harry's car has a backpack. Can you find the picture in which the car has a backpack?
Metaphor 3	This weekend, Stephen is going on holiday in his car. They have had to stop because Stephen's car has got a bad foot. Can you find the picture in which the car has a bad foot?
Metaphor 4	It's Saturday night, and Katy is playing with her toys before bed-time. Katy is a zebra playing with her toys. Can you find the picture in which Katy is a zebra?
Metaphor 5	This weekend, Emily is staying at her granny's house. Emily has had a bath and now she is a hedgehog. Can you find the picture in which Emily is a hedgehog?
Metaphor 6	It's Saturday, and Archie is going to a party. Archie is ready to leave for the party and he has a bush on his head. Can you find the picture in which Archie has a bush on his head?
Hyperbole 1	It's Saturday, and Tom is playing outside in the rain. He is splashing in the lake outside of his house. Can you find the picture in which Tom is splashing in the lake outside his house?
Hyperbole 2	This weekend, Jonny has been helping his mummy with the gardening. Now, the house is a forest. Can you find the picture in which the house is a forest?
Hyperbole 3	It is Saturday, and Emma and her daddy are having a picnic. Emma is very thirsty; she is drinking a bucket of juice. Can you find the picture in which Emma is drinking a bucket of juice?
Hyperbole 4	This weekend, Danny and his sister are playing in the living room. The sofa is a trampoline. Can you find the picture in which the sofa is a trampoline?
Hyperbole 5	It is Sunday, and Charlotte is putting on her new shoes. Her shoelaces are so difficult; they are skipping ropes. Can you find the picture in which Charlotte's shoelaces are skipping ropes?
Hyperbole 6	This weekend, Jane is playing in the garden with her daddy. Jane is flying through the air. Can you find the picture of Jane flying through the air?

2. Corresponding pictures

Practice 1

Correct

Incorrect

Incorrect

Practice 2

Correct

Incorrect

Incorrect

Practice 3

Correct

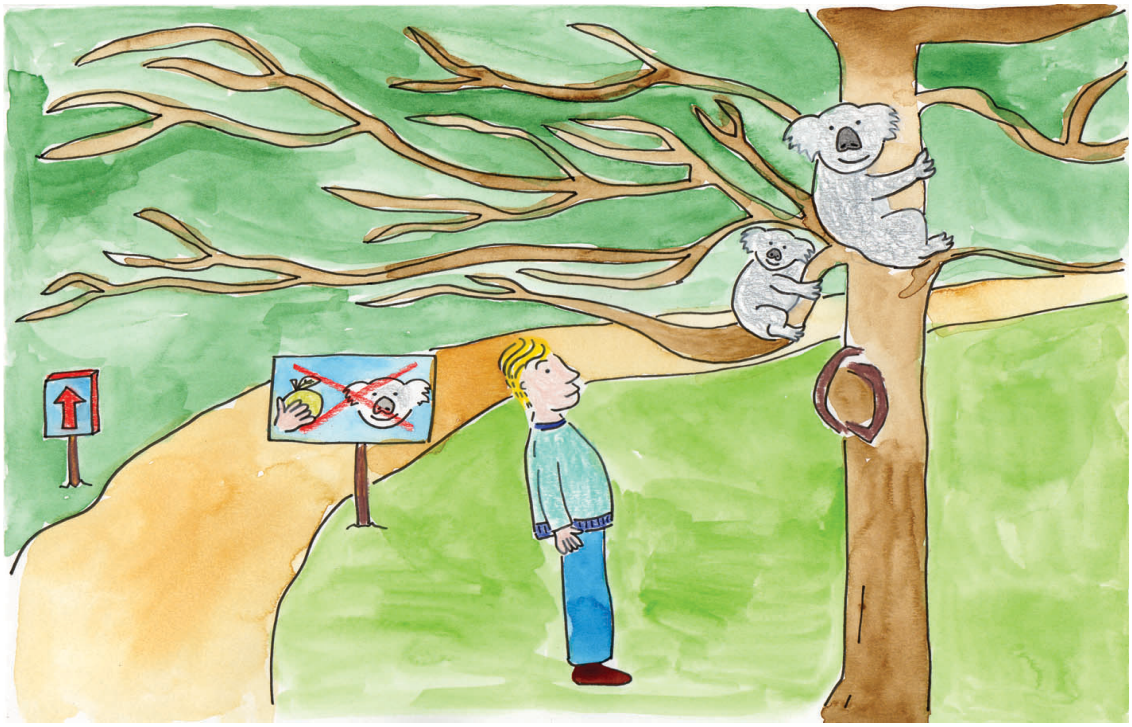
Incorrect

Incorrect

Metaphor 1

Metaphoric

Control



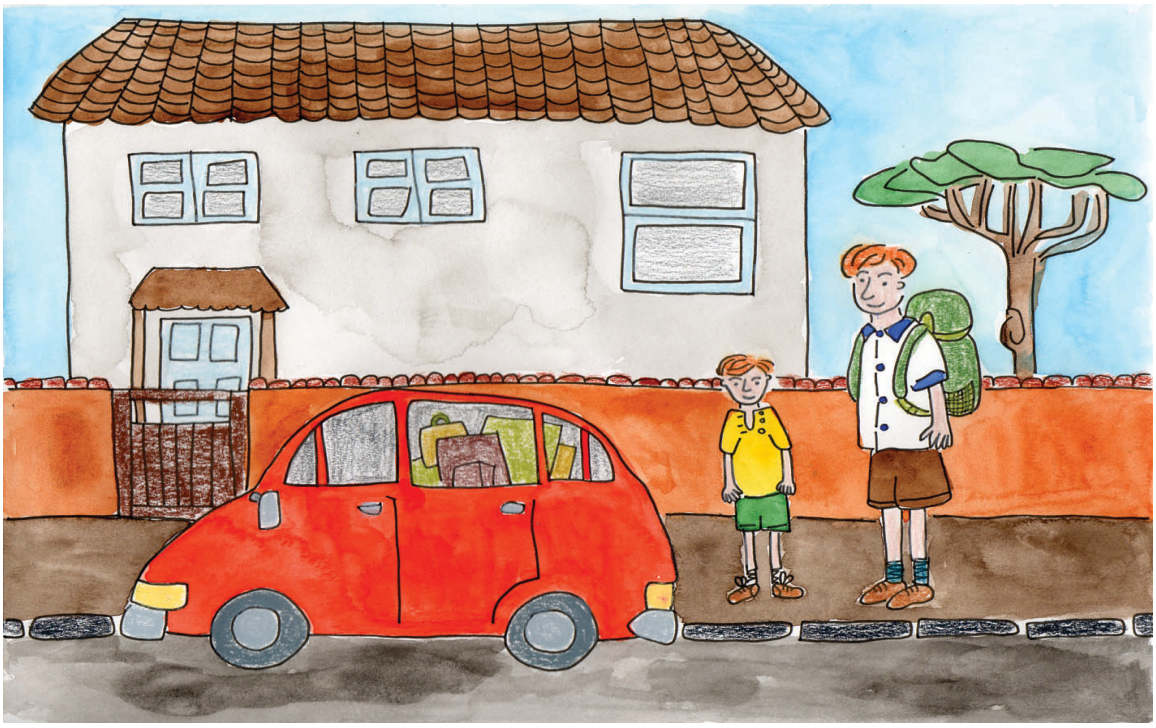
Literal

Metaphor 2

Metaphoric

Control

Literal



Metaphor 3

Metaphoric

Control

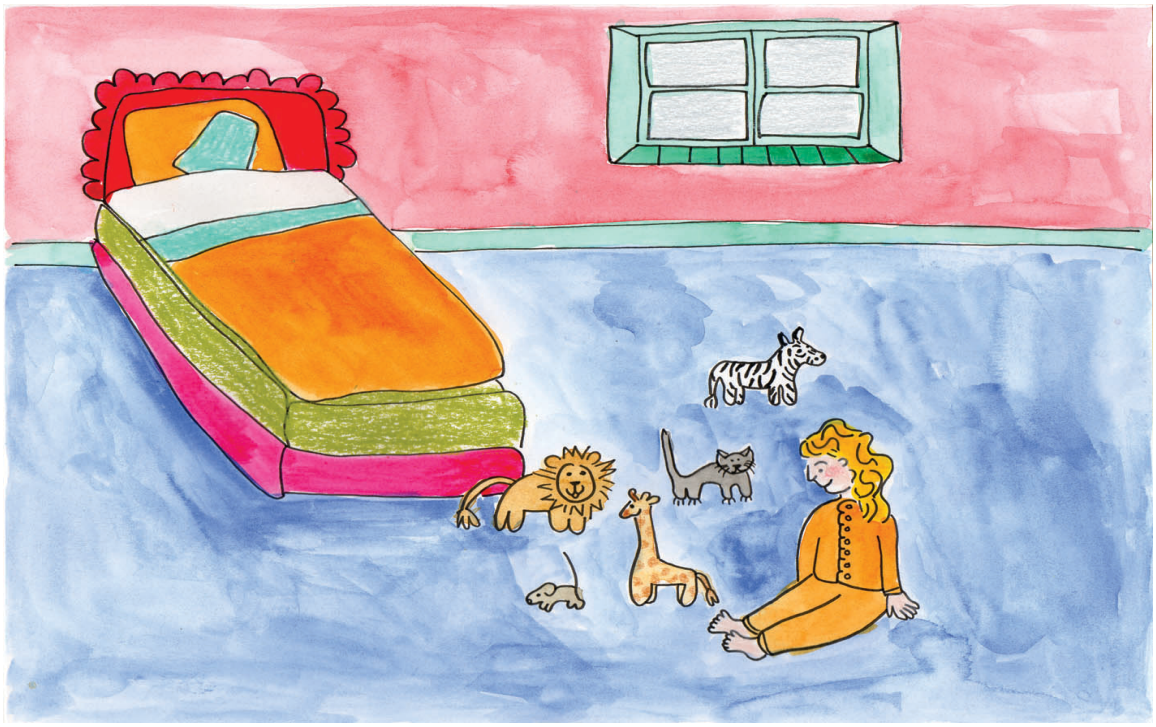
Literal

Metaphor 4

Metaphoric

Control

Literal



Metaphor 5

Metaphoric

Control

Literal

Metaphor 6

Metaphoric

Control

Literal

Practice 4

Correct

Incorrect

Incorrect

Practice 5

Correct

Incorrect

Incorrect

Practice 6

Correct

Incorrect

Incorrect

Hyperbole 1

Hyperbolic

Control

Literal

Hyperbole 2

Hyperbolic

Control

Literal

Hyperbole 3

Hyperbolic

Control

Literal

Hyperbole 4

Hyperbolic

Control

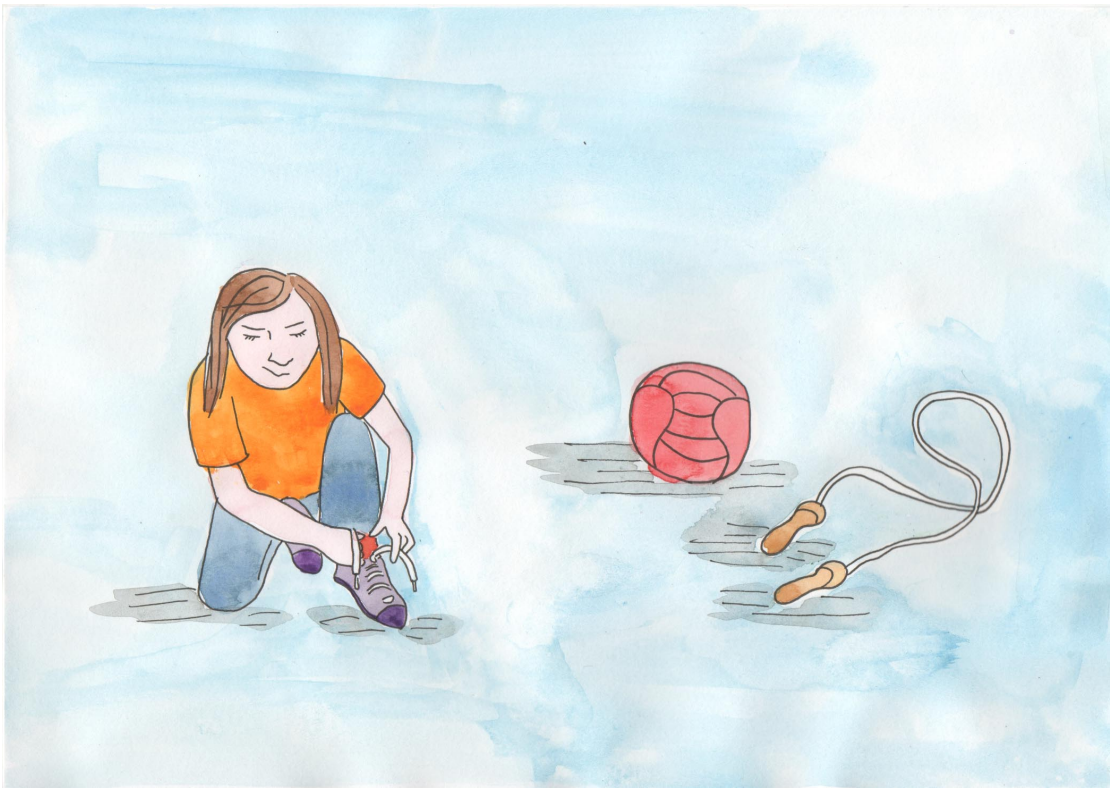
Literal

Hyperbole 5

Hyperbolic

Control

Literal



Hyperbole 6

Hyperbolic

Control

Literal